CORNELL
UNIVERSITY

Courses of Study

1992–1993

Cornell University Calendar

	1992–93	1993-94
Fall Semester		
Residence halls open	Friday, August 21	Friday, August 20
Freshman Orientation begins	Friday, August 21	Friday, August 20
New-student orientation begins	Sunday, August 23	
Registration–Course exchange	Tuesday–Wednesday, August 25–26	Tuesday–Wednesday, August 24–25
Instruction begins	Thursday, August 27	Thursday, August 26
Physical education classes begin	Monday, September 7	Monday, September 6
New-Student Parents' Weekend	Friday–Sunday, November 6–8	Friday–Sunday, October 22–24
Fall recess: instruction suspended	Saturday, October 10	Saturday, October 9
Instruction resumes	Wednesday, October 14	Wednesday, October 13
Pre-course enrollment for spring	Wednesday–Wednesday, October 21–November 4	Wednesday–Wednesday, October 20–November 3
Homecoming Weekend	Saturday, October 24	Saturday, November 6
Thanksgiving recess: instruction suspended, 1:10 p.m.	Wednesday, November 25	Wednesday, November 24
Instruction resumes	Monday, November 30	Monday, November 29
Instruction ends	Saturday, December 5	Saturday, December 4
Study period	Sunday–Wednesday, December 6–9	Sunday–Wednesday, December 5–8
Final examinations begin	Thursday, December 10	Thursday, December 9
Final examinations end	Saturday, December 19	Saturday, December 18
Residence halls close	Saturday, December 19	Saturday, December 18
Winter Session		
Variable periods between December 25 and January 18		
Spring Semester		
Residence halls open for continuing students	Sunday, January 17	Sunday, January 16
Residence halls open for new students	Monday, January 18	Monday, January 17
Registration–Course exchange	Thursday–Friday, January 21–22	Thursday–Friday, January 20–21
Instruction begins	Monday, January 25	Monday, January 24
Physical education classes begin	Monday, February 8	Monday, February 7
Spring recess: instruction suspended	Saturday, March 20	Saturday, March 19
Instruction resumes	Monday, March 29	Monday, March 28
Pre-course enrollment for fall	Wednesday–Wednesday, March 24–April 7	
Instruction ends	Saturday, May 8	Saturday, May 7
Study period	Sunday–Wednesday, May 9–12	Sunday–Wednesday, May 8–11
Final examinations begin	Thursday, May 13	Thursday, May 12
Final examinations end	Saturday, May 22	Saturday, May 21
Residence halls close (students who are graduating may stay through Commencement Day)	Saturday, May 22	Saturday, May 21
Senior Week	Sunday–Saturday, May 23–29	Sunday–Saturday, May 22–28
Commencement	Sunday, May 30	Sunday, May 29
Summer Session 1993		
Three-Week Session	Wednesday, June 2–Friday, June 25	
Eight-Week Session	Monday, June 14–Tuesday, August 10	
Six-Week Session	Monday, June 28–Tuesday, August 10	

The dates shown in this calendar are subject to change at any time by official action of Cornell University.

In this calendar, the university has scheduled classes, laboratories, and examinations on religious holidays. It is the intent of the university that students who miss those activities because of religious observances be given adequate opportunity to make up the missed work.

The Law School and College of Veterinary Medicine calendars differ in a number of ways from the university calendar. Please consult the catalogs of those colleges for details.

The courses and curricula described in this catalog, and the teaching personnel listed herein, are subject to change at any time by official action of Cornell University.

The rules and regulations stated in this catalog are for information only and in no way constitute a contract between the student and Cornell University. The university reserves the right to change any regulation or requirement at any time.

This catalog was produced by Media Services at Cornell University.

CORNELL UNIVERSITY

COURSES

OF STUDY

1992-1993

Cornell University

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Volume 84 of the series Cornell University consists of eight catalogs, of which this is number four, dated August 15, 1992. Issued once in February, once in June, once in July, three times in August, once in September, and once in November. Published by Media Services, Cornell University, Comstock Hall, Ithaca, New York 14853-0998.

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Abbreviations and symbols used in this catalog:

M	Monday	S-U	Satisfactory-Unsatisfactory
T	Tuesday	disc	discussion
W	Wednesday	lab	laboratory
R	Thursday	lec	lecture
F	Friday	rec	recitation
S	Saturday	sec	section
		TBA	To be announced
		@	geographic breadth
		#	historical breadth

Courses with names and descriptions enclosed in brackets—[ ]—are not offered fall 1992 and spring 1993.

Introduction

Courses of Study contains information primarily concerned with academic resources and procedures, college and department programs, interdisciplinary programs, and undergraduate and graduate course offerings of the university. Not included in this publication is information concerning the Medical College and the Graduate School of Medical Sciences, located in New York City. Information about other important areas is available from other offices of the university or is included in publications distributed to students. Students should consult with their college's advising office for specific information on academic policies and procedures, degree programs and requirements. The following is a list of offices and information sources for specific information:

Undergraduate admissions. Information pertinent to prospective applicants is available from the Undergraduate Admissions Office, 410 Thurston Avenue, Ithaca, New York 14850-9988 (telephone: 607/255-5241).

Graduate School. Information pertaining to admission to the Graduate School may be obtained by contacting the Graduate School, 100 Sage Graduate Center, Ithaca, New York 14853-6201 (telephone: 607/255-4884).

Law School. Admission information for the Law School is available from the Law School, Myron Taylor Hall, Ithaca, New York 14853-4901 (telephone: 607/255-5141).

Samuel Curtis Johnson Graduate School of Management. Information is available from the Office of Admissions, 315 Malott Hall, Ithaca, New York 14853-4201 (telephone: 607/255-2327).

College of Veterinary Medicine. Admission information is available from the Admissions Office, Schurman Hall, Ithaca, New York 14853-6401 (telephone: 607/253-3000).

Medical College and Graduate School of Medical Sciences. Information regarding admissions is available from the Office of Admissions, 1300 York Avenue, New York, New York 10021 (telephone: 212/746-1067).

Financial aid, loans, and student employment. Information is available from the Office of Financial Aid, 203 Day Hall, Ithaca, New York 14853-2801 (telephone: 607/255-5145).

Student accounts. Information on Cornell-Card, a student charge card, and payment of bills is available by contacting the Office of the Bursar, 260 Day Hall, Ithaca, New York 14853-2801 (telephone: 607/255-2336).

Dining and residence halls. Information is available from Cornell Dining, 1140 North Balch Hall, Ithaca, New York 14853-1401, and the Department of Residence Life, 2117 North Balch Hall, Ithaca, New York 14853-1401.

Student responsibility and regulations. The *Campus Code of Conduct* describes the regulations and policies for maintaining public order on campus. *The Code of Academic Integrity* and other statements of student responsibility are set forth in the *Policy Digest for Students, Faculty and Staff.* Publications are available for viewing on CUINFO, the university's electronic information system, and in print at the various university libraries, the Office of the Dean of Students, the Office of the Dean of the University Faculty, the Office of University Counsel, the Office of the Judicial Administrator, and the college offices.

Health services. University Health Services provides comprehensive medical and psychological care at the Gannett Health Center, 10 Central Avenue, Ithaca, New York 14853-3101 (telephone: 607/255-4082), adjacent to Willard Straight Hall. Information may be obtained by writing or visiting the center.

EXPLANATION OF COURSE NUMBERING SYSTEMS

The course levels have been assigned as follows:

100-level course—introductory course, no prerequisites, open to all qualified students

200-level course—lower-division course, open to freshmen and sophomores, may have prerequisites

300-level course—upper-division course, open to juniors and seniors, prerequisites

400-level course—upper-division course, open to seniors and graduate students, 200- and 300-level course prerequisites or equivalent

500-level course—professional level (e.g., management, law, veterinary medicine)

600-level course—graduate-level course, open to upper-division students

700-level course—graduate-level course

800-level course—master's level, thesis, research

900-level course—doctoral level, thesis, research

The list of courses that follows is arranged in two broad groups.

Group 1: Divisions that offer both undergraduate- and graduate-level courses

Agriculture and Life Sciences

Architecture, Art, and Planning

Arts and Sciences

Biological Sciences

Engineering

Hotel Administration

Human Ecology

Industrial and Labor Relations

Nutritional Sciences

Officer Education

Group 2: Graduate professional divisions

Law

Management

Veterinary Medicine

There are no courses offered by the Graduate School as a unit; graduate-level courses are contained in the various departments that offer the instruction.

Within each division, courses are generally arranged in alphabetical order by department and in numerical order within the departments. All courses, 0-999 are briefly described for those divisions (group 1) offering instruction to both undergraduate and graduate students. Courses in the graduate professional divisions (group 2) are designated by number and title only.

It is not possible to keep this single-volume course list completely up-to-date. The most current information regarding course schedules, sections, rooms, credits, and registration procedures may be found on CUINFO, in the *Course and Time Roster*, and in the *Course and Room Roster*, each issued twice a year by the Office of the University Registrar. Students are also advised to consult the individual college and department offices for up-to-date course information.

ACCREDITATION

Cornell University is accredited by the Middle States Association of Colleges and Schools. Requests to review documentation supporting its accreditation should be addressed to the Vice President of Planning, Cornell University, 433 Day Hall, Ithaca, New York 14853–2801.

Advanced Placement

CREDIT FOR ADVANCED PLACEMENT

1. **Definition and Purpose of Advanced Placement Credit**

   Advanced placement credit is college credit that students earn before they matriculate as freshmen. Students may use credit they receive for advanced placement to satisfy degree requirements only as specified by the individual college at Cornell. Although such credit counts toward the bachelor's degree, its primary purpose, is to exempt students from introductory courses and to place them in advanced courses. Its value is that it allows students to include more advanced courses in their undergraduate curricula.

2. **Advanced placement credit may be earned from one of the following:**

   a. Achieving the requisite score on a departmental examination at Cornell (usually given during Orientation Week) or from the *Advanced Placement Examinations from the College Board Admissions Testing Program (ATP).* The requisite scores which vary by subject, are determined by the

relevant departments at Cornell, and are published elsewhere in the *Courses of Study*.

b. Passing a regular course taught at an accredited college to college students and approved by the relevant department at Cornell. Some departments have delegated the review of courses to college staff according to guidelines they have formulated. Some departments review each request individually. Some departments accept credit from virtually all accredited colleges; some do not.

Credit for international credentials are evaluated individually.

Advanced placement credit is established by each department and administered by each college.

Please note: *Cornell University does not accept credit for courses sponsored by colleges but taught in high schools to high school students, even if the college provides a transcript of such work.* Students who have taken such courses may, however, take the appropriate Advanced Placement Examination offered by the College Board Admissions Testing Program in Princeton, New Jersey, to qualify for credit as in paragraph 2*a* above.

This statement was agreed upon by members of the Committee on Academic Records and Registration, 30, November 1990.

The final decision for awarding advanced placement credit at Cornell rests with each individual college. The appropriate department of instruction within the university sets the standards of achievement that must be met for advanced placement and recommends AP credit for those who meet the standards. This recommendation is almost always based on some examination score. For policies governing advanced placement in a specific college, see the academic information section of that college. Students need not accept advanced placement. They may repeat the course, thereby relinquishing the advanced placement credit.

The Advanced Placement (AP) Program of the College Entrance Examination Board (CEEB) is the best known and most generally used of the programs that provide students with an opportunity to document participation in a college-level curriculum at the secondary level.

Advanced placement examinations. Examinations sponsored by the Advanced Placement Program of the College Entrance Examination Board are considered. Entering freshmen should have their scores sent to their college or school office (see the list at the end of this section). Placement and credit on the basis of these examinations will usually be determined during the summer, and students will be notified before course scheduling.

Departmental advanced standing examinations. In certain subjects, students may also qualify for advanced placement or credit, or both, on the basis of departmental examinations given on campus during orientation week. A schedule of these examinations will appear in the orientation booklet that will be mailed to entering students in late summer. The departments that award advanced placement and credit on the basis of CEEB Advanced Placement Examinations or departmental examinations are shown below.

Transfer of credit. Entering freshmen who have completed college courses for which they want to receive credit toward their Cornell degree should send transcripts and course descriptions to their college or school office (see the list at the end of this section). The award of credit or placement for such courses is determined by the appropriate departments according to individual school and college guidelines. Because policy for using advanced placement credit varies according to each college's or school's professional and academic goals, students should consult their college or school office to determine how they may use such credit.

Foreign credentials. Information regarding Cornell's advanced standing policy for foreign credentials may be obtained by contacting the Associate Director of International Admissions, Cornell University, 410 Thurston Avenue, Ithaca, New York 14850-2488, U.S.A. Students holding foreign credentials who feel they may be eligible for advanced standing consideration should contact the International Students and Scholars Office before enrollment for clarification of the advanced standing policy.

Written inquiries. Many department, school, and college offices encourage students to contact them with any questions they may have. Addresses given in the following sections may be completed by adding Ithaca, New York 14853.

Forwarding of scores and transcripts. Entering freshmen should have their advanced placement test scores sent to their school or college registrar's office.

College of Agriculture and Life Sciences
177 Roberts Hall

College of Architecture, Art, and Planning
B2 West Sibley Hall

College of Arts and Sciences
M46 Goldwin Smith Hall

College of Engineering
170 Olin Hall

School of Hotel Administration
138 Statler Hall

College of Human Ecology
N101 Van Rensselaer Hall

School of Industrial and Labor Relations
101 Ives Hall

BIOLOGICAL SCIENCES

The Division of Biological Sciences grants advanced placement credits and exemption from introductory biology courses based on superior performance on the CEEB Advanced Placement Examination in biology.

Any student who earns a score of 5 on this examination may elect to receive eight credits and be permitted exemption from all introductory biology courses.

Students not majoring in biological sciences who score a 4 or 5 may receive, respectively, six or eight advanced placement credits. This will satisfy the distribution requirement in biological sciences for students in the College of Human Ecology, half of the distribution requirement in biological sciences for students in the College of Arts and Sciences through the Class of 1995, and a portion of the group B distribution requirement for students in the College of Agriculture and Life Sciences. For students in the College of Arts and Sciences in the class of 1996 and beyond, credits may be applied to the Group 1 distribution area in accordance with regulations stipulated by the college.

Biological sciences majors who receive a score of 5 may receive eight credits and be exempt from all introductory biology courses or elect to receive four credits and select one of the options allowed for majors with a score of 4. The student receiving a score of 4 must fulfill the introductory biology requirement by taking Biological Sciences 101–102, 101/103, 102/104, or 103–104 (Biological Sciences, Lectures and Laboratory). These students should consult information available in the course office (1140 Comstock Hall) and in the Biology Center (21 Stimson Hall) to determine which semester to take to complete the introductory biology requirement. For students in doubt, Biological Sciences 101/103 is advised. These students will receive a total of eight introductory biology credits (four advanced placement credits plus four course credits).

CHEMISTRY

The Department of Chemistry offers two sequences that satisfy prerequisites for further work in the department: Chemistry 207–208, an eight-credit sequence that includes qualitative analysis, and Chemistry 215–216, a nine-credit sequence that includes qualitative and quantitative analysis.

Freshmen may qualify for advanced placement and advanced standing credits in chemistry by satisfactory performance on the CEEB Advanced Placement Examination in chemistry or by passing an advanced standing examination offered by the department. A score of 5 on the CEEB examination entitles a student to four credits. A student may earn four or eight credits by suitable performance on the departmental examination. To take the departmental examination students must sign up beforehand with Mrs. Virginia Marcus, in 158 Baker Laboratory.

The specific course in which a student will register after having received a certain advanced placement standing will be decided by consultation between the student, his or her adviser, and the professors teaching the courses. Students receiving advanced placement who are interested in a major in chemistry or a related science should consider taking Chemistry 215–216 and should consult the Chemistry 215 instructor.

CLASSICS

For advanced placement and credit in Latin and Greek, students should consult the Department of Classics, Cornell University, 120 Goldwin Smith Hall.

Latin. Credit and placement are determined on the basis of a departmental examination. A student who is permitted to register in a 300-level course will be given six advanced placement credits.

Greek and Modern Greek. Credit and placement are determined on the basis of a departmental examination. A student who is permitted to register in a 300-level course will be given six advanced placement credits.

Summary of Credit and Placement

Subject	*Score*	*Advanced Placement Credit*	*Placement*
Arabic	Department of Near Eastern Studies determines credit and placement based on departmental examination.		
Biology‡	5 (majors)*	8 credits or 4 credits	Placement out of all introductory courses. Students may choose to accept only 4 credits and select one of the options allowed for majors with a score of 4.
	4 (majors)*	4 credits	4 AP credits awarded after completion of any combination of 4 credits from 101–104. Consult department to determine which semester to take to complete introductory biology.
	5 (nonmajors)	8 credits	Placement out of all introductory courses.
	4 (nonmajors)	6 credits	Placement out of 109–110. Does not always satisfy the prerequisite for second- and third-level courses in biology.
Chemistry‡	5	4 credits	Department determines placement.
Computer science	4,5	4 credits	Placement out of C.S. 100.
Economics	4,5	3 credits	3 credits each for micro and macro; 6 credits maximum.
English	4,5	3 credits	
French language	4,5	3 credits	Department of Modern Languages and Linguistics determines placement. Students may earn additional credit by taking CASE examination.†
French literature	4,5	3 credits (and proficiency)	Department of Romance Studies determines placement.
German language	4,5	3 credits	Department of Modern Languages and Linguistics determines placement. Students may earn additional credit by taking CASE examination.†
German literature	4,5	3 credits (and proficiency)	Department of German Studies determines placement.
American government and politics	4,5	3 credits	Placement out of Government 111.
Greek, Ancient and Modern	Department of Classics determines credit and placement based on departmental examination.		
Hebrew	4,5	3 credits	Department of Near Eastern Studies determines placement based on departmental examination.
American history	4,5	4 credits	
European history	4,5	4 credits	
History of art	4,5	3 credits	
Italian literature	4,5	3 credits (and proficiency)	Department of Romance Studies determines placement.
Latin	Department of Classics determines credit and placement based on departmental examination.		
Mathematics BC (excluding engineering students)	4,5	8 credits	Placement out of 111, 112. Permission to take 221, 293, or 213.
	3	4 credits	Placement out of 111. No advanced placement credit for students who take 111. Permission to take 112 or 192.
Mathematics AB (excluding engineering students)	4,5	4 credits	Placement out of 111. Permission to take 112, 122, or 192.
	3	4 credits	Placement out of 111. Permission to take 112 or 192.
	2	none	Students are strongly urged to take the mathematics placement examination.
Music	Department determines credit and placement based on departmental examination.		
Physics B‡	4,5	8 credits	Placement out of Physics 101–102.
	3	4 credits	Placement out of Physics 101.
Physics B, and Mathematics BC‡	4,5	4 credits in physics	Student may choose placement out of Physics 112 or 207 instead or Physics 101–102.
or Mathematics AB‡	5	4 credits in physics	Student may choose placement out of Physics 112 or 207 instead of Physics 101–102.
Physics C—Mechanics‡	4,5	4 credits	Student may choose placement out of Physics 112 or 207, or placement into Physics 116 with no AP credit. For more information, contact department representative.
Physics C—Electricity and Magnetism‡	5	Student may choose 4 credits for Physics 208 (or 213) or placement into Physics 217 with no AP credit. For more information, contact department representative.	
	4	Student may choose 4 credits for Physics 208 or placement into Physics 217 with no AP credit. For more information, contact department representative.	
Psychology	4,5	3 credits	
Sociology	Department determines credit and placement.		
Spanish language	4,5	3 credits	Department of Modern Languages and Linguistics determines placement. Students may earn additional credit by taking CASE examination.†
Spanish literature	4,5	3 credits (and proficiency)	Department of Romance Studies determines placement.
Turkish	Department of Near Eastern Studies determines credit and placement based on departmental examination.		

*Biological sciences majors and other students who expect to take advanced biology courses. These students will receive a total of 8 introductory biology credits (4 advanced placement credits and 4 course credits).
†Cornell Advanced Standing Examination. Contact the Department of Modern Languages and Linguistics, 203 Morrill Hall.
‡In the College of Arts and Sciences, AP credit may be used to satisfy half the distribution requirement in science.

COMPUTER SCIENCE

Students who receive a score of 4 or 5 on the CEEB Advanced Placement Examination in computer science will receive four advanced placement credits and may take Computer Science 211, 212, or 222 (provided, in the case of Computer Science 222, the mathematics prerequisites are met). These credits may be used to satisfy the requirement in computer programming for students in the College of Engineering or half the distribution requirement in mathematics for students in the College of Arts and Sciences.

Freshmen may also earn four credits by suitable performance on a departmental examination to be given during orientation week. Students who receive a score of 3 on the CEEB Advanced Placement Examination may choose, at their own risk and in consultation with their advisers, to go directly into a 200-level course without receiving credit for Computer Science 100. These students are strongly urged to take the departmental placement test. To take the departmental examination, students must sign up beforehand in the Undergraduate Office, 303 Upson Hall.

ECONOMICS

Students with a strong background in introductory economics may, with the consent of the instructor, register for intermediate courses without taking Economics 101–102.

ENGLISH

The English department will grant 3 credits to students who score 4 or 5 on the CEEB Advanced Placement Examination. The credits are granted automatically: no application to the department is required.

Students who receive scores of 700 or better on the CEEB College Placement Test in English composition, 700 or better on the CEEB College Placement Test in literature, or 4 or 5 on the CEEB Advanced Placement Examination are eligible to enroll, space permitting, in the following English freshman writing seminars: 270, 271, 272.

Advanced placement credits may not be used to fulfill requirements of the English major or distribution requirements of the College of Arts and Sciences.

GERMAN LITERATURE

The Department of German Studies will grant three credits to students with a score of 4 or 5 on the Advanced Placement Examination.

For information about the College Placement Test, see "Modern Languages," below.

HISTORY

The Department of History will grant four credits to students who score 4 or 5 on the CEEB Advanced Placement Examination in European history and four credits to those with such scores in the American history examination. Such credits are granted automatically, without application to the department.

These credits may not be used to fulfill requirements of the history major or distribution requirements of the College of Arts and Sciences.

HISTORY OF ART

The Department of History of Art will grant three credits to students who score 4 or 5 on the CEEB Advanced Placement Examination. Such credits are granted automatically, without application to the department.

These credits may not be used to fulfill requirements of the history of art major or distribution requirements of the College of Arts and Sciences.

MATHEMATICS

The Cornell calculus sequences discussed below are described under "Basic Sequences" in the Department of Mathematics section of this catalog.

The regular freshman calculus courses at Cornell do not differ substantially from calculus courses given in many high schools, and it is best to avoid repeating material that has already been covered at an appropriate level. Secondary school students who have had the equivalent of at least one semester of analytic geometry and calculus should, if possible, take one of the CEEB's two Advanced Placement Examinations (calculus AB or calculus BC) during their senior year.

The following rules do not apply to students being admitted to the College of Engineering. See the college's brochure for a detailed statement.

Students with a grade of 4 or 5 on the BC examination may take the appropriate third-semester course (Mathematics 213, 221, or 293), but students entering Mathematics 293 may have to make up some material on partial differentiation. Students with a 3 on the BC examination or a 4 or 5 on the AB examination may take the appropriate second-semester course (Mathematics 112, 122, or 192). Students with a 2 on the BC examination or a 3 on the AB examination may take one of the second-semester courses (Mathematics 112 or 192). Advanced placement credit will be awarded appropriately; however, no credit will be granted for a grade of 1 on the BC or 1 or 2 on the AB examination.

A grade of 3 or higher on the BC examination satisfies the distribution requirement in mathematics for students in the College of Arts and Sciences.

Note, however, that the grade of 3 is not sufficient for a full year of advanced placement credit in mathematics.

The placement examination in mathematics is offered at Cornell only during orientation week and should be taken by students who

1) have had at least a semester of calculus but did not take a CEEB Advanced Placement Examination;
2) have received a 2 on the BC examination or a 3 on the AB examination and want to enter the upper sequence; or
3) believe that the placement assigned on the strength of the CEEB Advanced Placement Examination is not high enough in their case.

Students are strongly urged to take the departmental placement test even if they feel that their grasp of the material is uncertain. The grade on this test does not become part of a student's record. No advance registration for the departmental examination is necessary.

MODERN LANGUAGES

Language placement tests. Students who have studied a language for two or more years and want to continue study in that language at Cornell must present the results of a Placement Test. In cases where no placement test exists for a particular language, the Department of Modern Languages and Linguistics designates a professor to handle placement for that language. Students who have had a year of formal study or substantial informal study since they last took a placement test should take the examination again during orientation week if they plan to continue course work.

Advanced standing credit. Advanced standing credit may be entered on a student's record as follows:

1) For three years of high school study in any one language, 3 credits are granted. Students with a score of 4 or 5 on the language AP Exam, or a minimum score of 650 on the language placement test, are eligible to take Cornell's Advanced Standing Examination (CASE). Outstanding performance on this examination could provide three additional credits.
2) For formal language work at an accredited college, credit is considered by the department on submission of a transcript and may be entered on the student's Cornell record.
3) Native speakers of languages other than English may, on examination by the appropriate professor, be granted a maximum of six credits if they can demonstrate proficiency equivalent to course work on the 200 level or above at Cornell. Additional credit will be considered only for those who pursue advanced work in their native language.

Information about times and places to take placement tests is available in the orientation booklet, from Academic and Career Counseling Services, and from the Department of Modern Languages and Linguistics. For more information, see the College of Arts and Sciences section on language course placement, or contact the Department of Modern Languages and Linguistics, Cornell University, 203 Morrill Hall.

MUSIC

Advanced placement and credit are awarded only in music theory and only on the basis of a comprehensive examination administered by the Department of Music, normally during orientation week. If special arrangements are made, the examination may be administered at other times during the academic year. All students interested in taking this examination should consult Professor E. Murray, 311 Lincoln Hall (telephone: 607/255-4675). Inquiries may be directed to the Department of Music, Cornell University, 104 Lincoln Hall (telephone: 607/255-4097).

NEAR EASTERN STUDIES

For advanced placement and credit in Arabic and Turkish, students should consult the Department of Near Eastern Studies, 360 Rockefeller Hall. All advanced placement and credit are determined by departmental examination.

PHYSICS

Advanced placement and credit are awarded on the basis of the CEEB Advanced Placement Examination in physics (physics B or physics C), certain international examinations, or the departmental examination (which may be taken during orientation week or at other times as arranged). For information about the departmental examination, students should consult Professor R. Cotts, 522 Clark Hall.

Physics B. Students earning a score of 4 or 5 may receive eight credits for Physics 101 and 102. Those earning a score of 5 in physics B with a score of 4 or 5 in calculus BC or a score of 5 in calculus AB may choose to accept four credits in Physics 112 or 207 instead of eight credits in Physics 101 and 102. Those earning a score of 3 will receive four credits in Physics 101.

Physics C.

1) C—Mechanics Students earning a score of 4 or 5 may receive four credits for Physics 112 or 207, or for placement into Physics 116 with no AP credit.
2) C—Electricity and Magnetism Students earning a score of 5 will be eligible for four credits for Physics 208 or 213, or for placement into Physics 217 with no AP credit. Students earning a score of 4 will be eligible for four credits for Physics 208 or placement into Physics 217 with no AP credit. Students with scores of 4 or 5 and who have questions may first meet with the department representative, Professor R. Cotts, 522 Clark Hall, for advice on making a selection.

Advanced placement into a next-in-sequence course depends on the completion of the appropriate mathematics prerequisites before enrolling. To qualify for advanced placement credit, it is not necessary to continue the study of physics.

General information and advice may be obtained from Professor R. Cotts, 522 Clark Hall, or from the Department of Physics, Cornell University, 109 Clark Hall.

PSYCHOLOGY

Students who scored 4 or 5 on the CEEB College-Level Examination Program psychology test may receive three advanced placement credits in psychology. Those interested in taking further courses in psychology should consult a faculty member in the Department of Psychology, Cornell University, 226 Uris Hall.

Advanced placement based on the CEEB test may not be used to satisfy the distribution requirement in the College of Arts and Sciences. Credit toward the requirements of a major in psychology will depend on the recommendation of the student's major adviser.

ROMANCE STUDIES (FRENCH, ITALIAN, AND SPANISH LITERATURE)

The Department of Romance Studies grants three credits to students with a score of 4 or 5 on the Advanced Placement Examination in French, Italian, or Spanish literature.

For information about the Placement Test in languages, see "Modern Languages," above.

University Registration

University registration is the official recognition of a student's relationship with the university and is the basic authorization of that student's access to services and education. Completion of registration is essential to enable the university to plan for and provide services and education, guided by the highest standards for efficiency and safety. Unauthorized, unregistered persons who use university services and attend classes have the potential to use university resources inappropriately and to displace properly registered students. In addition, the university assumes certain legal responsibilities for persons who participate as students in the university environment. For example, registration policy states that New York State health requirements must be satisfied. These requirements are intended to safeguard the public health of students, and the university has a responsibility to enforce the state regulations through registration procedures.

The policy on university registration is intended to describe clearly the meaning of and the procedures for registration so that students can complete the process efficiently and be assured of official recognition as registered students. With the clear communication of the steps for registration, it is hoped that compliance will occur with a minimum of difficulty.

To become a registered student at Cornell University, a person must

- complete course enrollment according to individual college requirements.
- pay tuition for the current semester.
- satisfy New York State health requirements.
- have no holds from the college, the office of the Judicial Administrator, Gannett Clinic, the University Registrar, or the Bursar.

Students must accomplish the above tasks by the end of the third week of the semester.

Cornell University does not allow persons who are not registered with the university or enrolled in courses in a given semester to attend classes. The university reserves the right to require unauthorized, unregistered persons who attend classes or in other ways seek to exercise student privileges to leave the university premises. The university does not permit retroactive registration and does not record courses or grades for unregistered persons.

COURSE ENROLLMENT

Pre-course enrollment for each semester at Cornell takes place partway through the preceding semester. Dates are announced in advance and are usually posted in school and college offices. Each college or school notifies students about special procedures. Students are often expected to meet with their advisers during this period to affirm that the courses they plan to take will ensure satisfactory progress toward a degree. Students complete a course enrollment form, then return the form to their college office. Each student is sent a course confirmation statement listing the courses processed from the enrollment form. Class schedules are distributed later by the college offices, often during the same days as university registration.

New students and transfer students are sent course enrollment instructions by their college offices before they arrive on campus. Procedures vary from college to college.

Students who fail to submit a course enrollment form during the designated period may be charged a penalty fee. The fees are listed in the chart in the following section.

COURSE DROP/ADD/CHANGE PERIOD

Students may adjust their schedules during drop/add/change periods. A form is completed by the student and signed by both the student's adviser and an appropriate representative of the department offering the course (an instructor, department staff member, or college registrar, depending on the college). The completed and signed form must be returned to the student's college office to be processed. See the chart on the following page for the course drop/add/change fees. Professional schools and the physical education department have different add-drop policies.

Late Course Enrollment and Late Drop/Add/Change Fees

Academic Unit	*Late Course Enrollment Fee*	*Late Course Drop/Add/ Change Fee*
College of Agriculture and Life Sciences	No fee	No fee
College of Architecture, Art, and Planning	No fee	No fee
College of Arts and Sciences	No fee	No fee
School of Continuing Education and Summer Sessions	†	†
College of Engineering	No fee	No fee
School of Hotel Administration	No fee	No fee
College of Human Ecology	No fee	No fee
School of Industrial and Labor Relations	No fee	No fee
Johnson Graduate School of Management	$100	$100
Athletics and physical education	$30	$20*
Internal Transfer Division	No fee	No fee
Veterinary medicine	15*	15*

*Consult the college office for special considerations and requirements.

†Consult the Summer Session catalog and the Division of Extramural Study brochure for fees.

AUDITING COURSES

Summer school and extramural students may officially register as visitors (auditors) in courses and have this entered on their permanent records if their attendance is reported as satisfactory. Graduate students may register for courses as auditors but will not have the courses listed on their transcripts. Undergraduates may not register to audit courses.

LEAVES AND WITHDRAWALS

A leave of absence must be requested from the college in which the student is enrolled. A leave of absence is granted for a specified time, after which the student is expected to return to resume course work. The student should inform the college of enrollment of his or her intent to return.

A student may withdraw from the university at the student's discretion. However, a college may withdraw a student who fails to return at the end of a period of authorized leave.

Medical leaves are granted and processed through University Health Services.

Internal Transfer Division

Students may not always be satisfied with the original Cornell school or college into which they've been admitted. They may decide to transfer from one college to another, within the university. This process is called internal transfer, and application procedures and deadlines vary by college. It may be possible to be admitted directly into the new program. Students who are uncertain if they immediately qualify for direct transfer, however, should apply to the Internal Transfer Division (ITD). To apply, candidates must interview with the division's director and submit an essay to the ITD office outlining their reasons for wanting to transfer. Internal Transfer Division applicants must also fulfill the application requirements (e.g., interviews, essays) of their target college as if they were applying for direct transfer. In many cases, colleges formally sponsor students in ITD and essentially guarantee admission if students successfully complete the requirements (taking particular courses, earning a specified grade point average while enrolled in ITD) that are outlined in their letter of sponsorship. Although sponsorship does not guarantee admission to the Internal Transfer Division, it is the most important factor determining acceptance into ITD. Students can apply simultaneously for direct transfer and to ITD, so that if direct transfer is denied they might be offered the option of being sponsored in the Internal Transfer Division. For more information about transfer requirements, students should contact the admissions office of the college they hope to enter and the office of the Internal Transfer Division, 220 Day Hall (255–4386).

Bursar Information

TUITION, FEES, AND EXPENSES

Tuition for Academic Year 1992-93

Endowed Divisions

Undergraduate

Architecture, Art, and Planning Arts and Sciences Engineering Hotel Administration	$17,276

Graduate

Graduate School (with major chair in an endowed division)	17,252

Professional

Law School	18,132
Management	18,532

Statutory Divisions

Undergraduate

Agriculture and Life Sciences Human Ecology Industrial and Labor Relations	
New York resident*	7,056
Nonresident*	13,306

Graduate

Graduate School (with major chair in agriculture, human ecology, or industrial and labor relations),	$8,232
Graduate School—Veterinary Medicine	9,132

Professional

Veterinary Medicine	
New York resident*	11,032
Nonresident*	14,032

Summer Session

Per credit	375

Other Tuition and Fees

In absentia fees

Graduate	$200 per term
Undergraduate	15 per term
Law and Management	75 per term

The amount, time, and manner of payment of tuition, fees, or other charges may be changed at any time without notice.

*Residency status is determined at the time of admission by the college. Change in residency status is determined by the bursar.

Fees and Expenses

Undergraduate applicants to Cornell pay a non-refundable $60 application fee when submitting an application for admission. The graduate application fee is $60. Application to the Johnson Graduate School of Management costs $75.

Tuition Refund Policy

Amounts personally paid for tuition may be refunded if the student requests a leave of absence or withdrawal from the office of the dean of his or her college of enrollment. The date of this request will determine the tuition liability for the semester. Students who terminate their registration with the university during a fall or spring semester in this manner will be charged tuition from the university registration day through the date of their request as follows: first six days of the semester (including university registration day), no charge; seventh day of the semester, 10 percent; second week, 20 percent; third week, 30 percent; fourth week, 40 percent; fifth week, 60 percent; sixth week, 80 percent; seventh week to the end of the semester, 100 percent.

Repayment policy. Students receiving financial aid from the university who withdraw during a term will have their aid reevaluated, possibly necessitating repayment of a portion of aid received. Repayment to aid accounts depends on the type of aid received, government regulations, and the period of time in attendance. A partial semester will generally count as one of the eight semesters of financial aid eligibility normally allowed a student.

BILLING AND PAYMENT

Billing

Tuition and room and board charges will be billed in July and December and must be paid prior to registration. The due date for these semester bills will normally be five to ten working days prior to ID validation day. All

other charges, credits, and payments will appear on monthly statements mailed before the twenty-fifth of every month.

It is possible that some charges will not be listed on the first bill and will appear on a subsequent monthly bill. *A student must be prepared to pay any charges appearing on a subsequent bill even though the student receives a financial aid stipend before the charges are billed.*

All bills are due by the date stated on the bill; all payments must be *received* by that date to avoid *finance charges.* Payments are *not* processed by postmark.

Please inform the Office of the Bursar of any change in billing address. *Address changes made at other offices will not change the billing address.* The address initially used on billing statements will be the home address as listed on each student's application for admission.

Payments

An individual who has outstanding indebtedness to the university will not be allowed to register* or reregister in the university, receive a transcript of record, have academic credits certified, be granted a leave of absence, or have a degree conferred. If students' bills show a previous unpaid balance, they must make payment by August 9 for current semester's charges if they plan to register for the fall semester. University policy precludes the use of any current financial aid for payment of past-due charges.

The Office of the Bursar acts as a clearinghouse for student charges and credits that are placed directly on a student's bill by several departments and offices of the university. *Since the Office of the Bursar does not have detailed records concerning many items that appear on a bill, students should contact the office involved if they have questions.*

For further information, students should contact the Office of the Bursar, Cornell University, 260 Day Hall, Ithaca, New York 14853-2801 (telephone: 607/255-2336).

*For specific exceptions, see "Bursar and Cornellcard Procedures," published by the Office of the Bursar, 260 Day Hall.

ACCIDENT AND SICKNESS INSURANCE

The accident and sickness insurance charge on the July billing statement is for insurance for hospitalization, surgical fees, and major medical coverage for the period of August 26, 1992, through August 24, 1993. The cost of this insurance is lower than the average cost of comparable coverage under other group accident and health insurance policies. Information is included with the July bill.

For those who do not want medical insurance coverage, a medical insurance waiver must be signed. More information can be obtained by contacting the Gannett Health Center (telephone: 607/255-6363).

University Requirements for Graduation

For degree requirements such as residency, number of credits, distribution of credits, and grade averages, see the individual requirements listed by each college or school or contact the college offices.

PHYSICAL EDUCATION

All undergraduate students must complete two terms of work in physical education unless exempted from this requirement for medical or other special reasons or by virtue of advanced standing on admission. For transfer students the requirement is reduced by the number of terms satisfactorily completed, not necessarily including physical education, in a college of recognized standing before entering Cornell.

Credit in physical education may be earned by participating in courses offered by the Department of Athletics and Physical Education, participating on an intercollegiate athletic team as a competitor or manager, or performing in the marching band.

Physical education is a requirement of the first two terms at Cornell. Students must register for it in each term, except those in which postponements are granted, until the requirement is satisfied.

Temporary postponements may be granted on the basis of physical disability, schedule conflicts, or excessive work load (employment exceeding twenty hours a week). The Gannett Health Center can provide certifications based on health, and the Financial Aid Office can provide certifications of employment. Students should see the director or assistant director of Physical Education to establish postponements or waiver of the requirement. Questionable or unusual cases may be resolved by petition to the Faculty Advisory Committee on Athletics and Physical Education.

Swim test. All new students who do not pass a basic seventy-five-yard swim test are required to include swimming in their program of physical education unless they are excused by Gannett Health Center. All nonswimmers are required to register in beginning swim classes. Completion of two semesters of beginning swimming will satisfy the swimming requirement.

STUDENT RESPONSIBILITIES

Students are responsible for meeting all requirements for the courses in which they are enrolled, as defined by the faculty members teaching the courses. It is also the student's responsibility to be aware of the specific major, degree, distribution, college, and graduation requirements for completing his or her chosen program of studies. Students should know how far they have progressed in meeting those requirements at every stage of their academic career.

Class Schedules and Examinations

CLASS ATTENDANCE AND ABSENCES

Students are expected to be present throughout each term at all meetings of courses for which they are registered.

The right to excuse a student from class rests at all times with the faculty member in charge of that class.

All lectures, recitations, and similar exercises start at 8 a.m., 9:05 a.m., 10:10 a.m., 11:15 a.m., 12:20 p.m., 1:25 p.m., 2:30 p.m., or 3:35 p.m. and last fifty minutes, except that on Tuesday and Thursday the first and second, the third and fourth, the fifth and sixth, and the seventh and eighth periods may be combined to allow for longer meeting times.

All laboratories and similar exercises that continue for 1 hour and 55 minutes, 2 hours and 25 minutes, or 3 hours are scheduled as shown below.

Schedule for Classes Longer than Fifty Minutes

1 hour and 55 minutes

8:00 a.m.–9:55 a.m.

10:10 a.m.–12:05 p.m.

12:20 p.m.–2:15 p.m.

2:30 p.m.–4:25 p.m.

7:30 p.m.–9:25 p.m.

2 hours and 25 minutes

7:30 a.m.–9:55 a.m.

10:10 a.m.–12:35 p.m.

2:00 p.m.–4:25 p.m.

7:30 p.m.–9:55 p.m.

3 hours

8:00 a.m.–11:00 a.m.

10:10 a.m.–1:10 p.m.

1:25 p.m.–4:25 p.m.

7:30 p.m.–10:30 p.m.

On Monday, Tuesday, Wednesday, and Thursday the hours of 4:25 to 7:30 p.m.; on Friday the hours after 4:25 p.m; on Saturday the hours after 12:05 p m.; and all day Sunday are free from all formal undergraduate class or laboratory exercises.

Evening classes are held only on Monday and Wednesday and only when regularly scheduled and included in written college announcements or when recommended by the Committee on Academic Records and Registration. Evening lectures, recitations, and similar exercises start at 7:30 and 8:35 p.m.; evening laboratories and similar exercises start at 7:30 p.m.

Evening preliminary examinations that will be given outside of normal class hours may be scheduled on Tuesday and Thursday evenings only, beginning at 7:30 p.m. All room assignments are scheduled by the Office of the University Registrar. The dates and times of these examinations are listed in the *Course and Room Roster* for each term.

Any exception to the above regulations, other than those for evening preliminary examinations, will require permission of the dean or

director of the college or school offering the course. Exceptions to the regulations on evening preliminary examinations require approval of the dean of the University Faculty. All such exceptions must include provision of special arrangements for the students for whom conflicts are generated by such an exception.

FINAL EXAMINATIONS

Final examinations for undergraduate courses are scheduled by the Office of the University Registrar. Examinations may be one, two, or two and one-half hours in length at the discretion of the department concerned. The schedule of final examinations is available in the *Course and Time Roster* and the *Course and Room Roster*, both of which are published through the Office of the University Registrar twice per year. Examinations not listed in the registrar's examination schedule will be arranged by the professor in charge and must fall within the announced examination period, except by permission of the dean of the faculty in accordance with existing faculty legislation.

General Rules Governing Final Examinations

Legislation of the University Faculty governing study periods and examinations is as follows:

1. No final examinations can be given at a time other than the time appearing on the official examination schedule promulgated by the University Registrar's office without prior written permission of the Dean of the Faculty.
2. No permission will be given, for any reason, to schedule final examinations during the last week of classes or the designated study period preceding final examinations.
3. Permission will be given by the Dean of the Faculty to reschedule examinations during the examination period itself if requested in writing by the faculty member, but only on condition that a comparable examination also be given for those students who wish to take it at the time the examination was originally scheduled. The faculty member requesting such a change shall be responsible for making appropriate arrangements for rooms or other facilities in which to give the examination. This should be done through the Registrar's Office.
4. No tests are allowed during the last week of scheduled classes unless such tests are part of the regular week-by-week course program and are followed by an examination (or the equivalent) in the final examination period.
5. Papers may be required of students during the study period if announced sufficiently far in advance that the student did not have to spend a significant segment of the study period completing them.
6. Faculty can require students to submit papers during the week preceding the study period.
7. Take-home examinations should be given to classes well before the end of the regular term and should not be required to be submitted during study period but rather well into the examination period.

The university policies governing study period and final examinations are:

a) Each course should require that a final examination or some equivalent exercise (for example, a term paper, project report, final critique, oral presentation or conference) be conducted or due during the period set aside for final examinations.

b) Although not specifically prohibited, it is university policy to discourage more than two examinations for a student in one twenty-four hour time period and especially on any one day. It is urged that members of the faculty consider student requests for a make-up examination, particularly if their course is the largest of the three involved and thus has the strongest likelihood of offering a make-up for other valid reasons, i.e., illness, death in the family, etc.

c) Students have a right to examine their corrected exams, papers, etc., to be able to question their grading. (Note that students have no absolute right to the return thereof.) Exams, papers, etc., as well as grading records, should be retained for a reasonable time after the end of the semester, preferably till the end of the following term, to afford students such right of review.

EVENING PRELIMINARY EXAMINATIONS

The most convenient times and places for "prelims" are the normal class times and classrooms. In cases where the only alternative is to hold evening preliminary examinations, they may be scheduled only on Tuesday and Thursday evenings and only after 7:30 p.m.

An alternative time to take the examination *must* be provided for those students who have academic, athletic, or employment conflicts at the time scheduled.

Note that instructors holding evening examinations are strongly urged to indicate this in the course descriptions listed in *Courses of Study* and *must* notify students of the dates of such examinations as early as possible in the semester, preferably when the course outline is distributed. For more information on the policy governing evening examinations, contact the office of the dean of the faculty, 315 Day Hall.

Grading Guidelines

The official university grading system uses letter grades with pluses and minuses. Passing grades range from A + to D -; F is failing. INC denotes a grade of incomplete, and R is the grade given at the end of the first semester of a year-long course. The grades of INC and R do not have quality-point equivalents attached. These are the quality-point equivalents:

A+ =4.3	B+ =3.3	C+ =2.3	D+ =1.3
A =4.0	B =3.0	C =2.0	D =1.0
A– =3.7	B- =2.7	C- =1.7	D- =0.7
			F =0.0

This is how a term average is computed:

Course	*Grade*	*Quality Points*	*Credits*	*Product*
Chemistry 103	B+	3.3	3	9.9
English 151	C–	1.7	3	5.1
DEA 145	B	3.0	x 4 =	12.0
CEH 100	B	3.0	3	9.0
DEA 111	C	2.0	3	6.0
Total			16	42.0

To arrive at the term average, add the products (credits x quality points) and divide by the number of credits taken. Here, 42 divided by 16 equals 2.63.

The cumulative average (an average of grades from two or more terms) equals the sum of the products of all the grades at Cornell divided by the total number of credits taken.

S-U GRADES

On September 6, 1972, the Faculty Council of Representatives passed the following legislation:

"Resolved, that:

A. the S-U system have symbol equivalents which are uniform within the university: "S" means C– or above; "U" means D+, D, D–, or failure.

B. S-U options be chosen by the student during the first three weeks of the term.

C. the Announcements and/or supplementary course registration material describing each course include a description of the course grading options, particularly if the course is graded with an exclusive S-U. Any change in grading options must be announced by the instructor within the first two weeks of the term.

D. course requirements (required reading, term paper, etc.) be the same for students electing S-U grades as for those electing letter grades."

The rules for the S-U option are further defined by each of the Academic Units. They are as follows:

Agriculture and Life Sciences. (a) Must have 100 credit hours with A, B, C, D grades. (b) The S-U option is available only in those courses so designated in the course catalog after approval by the Educational Policy Committee. (c) Freshmen may not exercise the S-U option.

Architecture, Art, and Planning. (a) All courses specifically required for a degree excluded. Various departments may designate specific required courses where S-U will be permitted. (b) In a course designated as S or U, the entire class is so graded. The instructor must announce this decision within the first two weeks of class. (c) Where the option for S or U exists, both student and instructor must agree on the option. This agreement must be made by the end of the third week of classes on the appropriate form in the College Office. Once agreed upon, this grade option will be used for the final grade.

Arts and Sciences. (a) Courses that count toward satisfaction of major requirements should not be taken for an S or U grade unless the department grants permission. (b) Permission of instructor. (c) A minimum of 80

of the 120 hrs. required for the A.B. degree must be in courses for which the student has received letter grades.

Engineering. (a) May take one Humanities and Social Sciences, Approved, or Free Elective per term after completing first semester. (b) This option may be elected during Pre-Course Enrollment or with the written permission of the instructor and adviser on an add/drop form in the first 3 weeks of classes. (c) Decision irrevocable after first 3 weeks of term.

Graduate School. (a) Seminars and Thesis Research courses are usually graded S/U, and should be registered accordingly or a grade error results at semester's end. Other courses may be registered as S-U only if offered as S-U option.

Hotel. (a) Maximum of four free-elective credit hours per term. (b) Exceptions are required hotel courses or elective hotel courses offered only on S-U basis.

Human Ecology. (a) Not part of student's major. (b) May be used in the 15 hours required outside the major in Human Ecology courses. (c) Not part of 39 hours required in humanities, natural sciences, and social sciences. (d) A department may approve S-U grading in specific courses if approved by Educational Policies Committee. (e) Only juniors and seniors may take courses in which both letter grades and S-U are options. (f) Sophomores may take courses in which S-U is offered but letter grades are not offered. (g) Freshmen enrolled in English 137 and 138, which are only offered for S-U credit, are permitted to apply these courses to the freshman seminar requirements. (h) Total of four S-U courses during student's college career.

Industrial and Labor Relations. (a) This option may be elected, if available in I&LR electives, or in out-of-college electives but not including directed studies. (b) Degree requirements include a minimum of 105 lettergrade (A + to D -) credits. (c) Student must also be in good academic standing. (d) A "U" is considered the equivalent of an "F" in determining a student's academic status. (e) Limited to two courses per term, not to exceed four hours in any one course.

Unclassified. (a) S-U grades permitted only when it is the only option or (b) when specifically approved by an admissions officer in the school or college to which the student plans to transfer.

Veterinary Medicine. (a) There are seven courses in the veterinary core curriculum that are offered on an S-U basis only. All other required core courses must be taken for a letter grade. (b) Elective courses for veterinary students may be offered on a S/U basis at the option of the professor.

INCOMPLETE

The grade of incomplete is appropriate only when two basic conditions are met:

1) the student has a substantial equity at a passing level in the course with respect to work completed, and
2) the student has been prevented by circumstances beyond the student's control, such as illness or family emergency, from completing all of the course requirements on time.

A grade of incomplete may not be given merely because a student fails to complete all course requirements on time. It is not an option that may be elected at the student's own discretion.

While it is the student's responsibility to initiate a request for a grade of incomplete, reasons for requesting one must be acceptable to the instructor, who establishes specific make-up requirements. The instructor has the option of setting a shorter time limit than that allowed by the student's college for completing the course work. Several colleges require that a statement signed by the instructor be on file indicating the reason for the grade of incomplete and the restriction, if any.

It is the responsibility of the student to see that all grades of incomplete are made up within the deadline and that the grade has been properly recorded with the student's college registrar.

CHANGES IN GRADES

Changes in a grade may be made only if the instructor made an error in assigning the original grade.

OFFICIAL TRANSCRIPTS

An official transcript is one that bears the official seal of the university and the signature of the university registrar, sent in a sealed envelope directly from the Office of the University Registrar to another institution or agency as directed by the student. Transcripts can be obtained through the Office of the University Registrar, 222 Day Hall.

STUDENT RECORDS POLICY

Under the Family Educational Rights and Privacy Act of 1974 (FERPA), Cornell University is required to advise students of their rights concerning their education records. Education records include records directly related to a student and maintained by an educational institution or party acting on its behalf. The law gives students the right to

a) inspect and review their education records;
b) challenge contents of education records;
c) a hearing if the challenge is unsatisfactory;
d) include an explanatory statement in the education records if the outcome of the hearing is unsatisfactory;
e) prevent disclosure of personally identifiable information*;
f) secure a copy of the institutional policy which includes the location of all education records**; and
g) file complaints with the Department of Education concerning institutional failure to comply with the act.

*Directory information is a category of personally identifiable information that includes name, home address, local address, local telephone listing, dates of attendance at Cornell, major field of study and college attended, previous educational agency or institution attended, participation in officially recognized activities (in athletics, the weight and height of members of athletic teams), degrees earned and awards. Directory information may be released unless the student indicates otherwise at the time of registration. Students who wish no release of their directory information must inform the Office of the University Registrar in writing within 10 days of the date of official university registration each academic year. Students may rescind their no release request at any time in writing to the Office of University Registrar.

**Copies of the "Cornell University Policy on Access to and Release of Student Education Records" are available at the Office of the University Registrar, 222 Day Hall.

POLICY ON POSTING OF STUDENT INFORMATION

In compliance with the university's policy on student educational records, and the U.S. Department of Education's Family Educational Rights and Privacy Act of 1974 (FERPA), restricted student information may not be posted.

Accordingly, the following student information is considered restricted and therefore may not be posted:

Student social security number

Student identification number

Course elected

Grades earned

Grade point average

Class rank

Date of birth

Place of birth

Home telephone listing

Academic and disciplinary actions

Student or administrative committees

The most recent student educational records from previous educational agency or institution

Financial arrangements between the student and the university

Any other education record containing personally identifiable information

For further information, please refer to the revised *Policy on Access to and Release of Student Education Records* from the Office of the University Registrar, 222 Day Hall, or from your college registrar.

Academic Integrity

Absolute integrity is expected of every Cornell student in all academic undertakings. Any fraudulent act by a student to advance his or her academic status merits a severe penalty and such cases are governed by the Code of Academic Integrity. A pamphlet entitled the *Code of Academic Integrity and Acknowledging the Work of Others* is distributed to new and transfer students by their college, and is also available from the Office of the Dean of Faculty. The policy is published in the *Policy Notebook*, available free of charge from the Office of the Dean of Students.

PROTECTION OF HUMAN SUBJECTS IN RESEARCH

The University Committee on Human Subjects is the official review board of all university projects that use humans as research subjects. Projects affected by this restriction include, but are not limited to, surveys, questionnaires, studies of existing data, documents, records in which there are no identifiers, as well as mental and physical tests of human subjects. Requests for student information must be submitted in writing to the Assistant Vice President for Academic Programs and Campus Affairs, 311 Day Hall. All proposals involving human subjects in any category must be submitted to the committee for review. Inquiries, communications, and requests for guidelines should be directed to the committee's Executive Secretary, 117 Day Hall (255-5014). The guidelines are also available on CUINFO under OSP (Office of Sponsored Programs).

USE OF ANIMALS FOR COURSES

The Cornell University Institutional Animal Care and Use Committee has made the following statement on the use of animals for courses: "In certain courses the use of vertebrate animals serves as an invaluable aid in instruction. It is recognized, however, that some students have ethical objections to the use of vertebrate animals in this manner. Courses that use vertebrate animals are identified as such in the course descriptions. Students who have concerns about the use of animals in these courses should consult the course instructor for more information about the precise ways in which the animals are used. A set of university guidelines on the use of vertebrate animals in teaching for faculty and students is available from departments in which the courses are offered. A student who is reluctant to voice his or her concerns about animal use in a particular course, or who thinks these concerns have not received proper attention, may seek assistance from the director of the Cornell Center for Research Animal Resources (253-3516)."

Interdisciplinary Centers, Programs, and Studies

ANDREW D. WHITE PROFESSORS-AT-LARGE

G60e Van Rensselaer Hall (255-0833).

The program has its origins in Cornell's early history. Andrew D. White, the first president of Cornell University, inaugurated the position of nonresident professor, to be held by eminent scholars, scientists, and intellectuals who periodically visit the university for the stated purpose of "contributing to the intellectual and cultural life of the university." Toward this end, Professors-at-Large engage in a variety of activities including public lectures, participation in ongoing courses, and collaborative research, as well as holding office hours for undergraduate and graduate students. Professors-at-Large serve for a six-year term and are full members of the faculty when in residence.

Term Ending in 1992

Choay, Françoise, historian of architecture and city planning. Institut d'Urbanisme, University of Paris

Mazrui, Ali A., Africanist, political scientist. University of Michigan and University of Jos, Nigeria

Thorne, Kip, astrophysicist. California Institute of Technology

Term Ending in 1993

Allegre, Claude J., geological scientist. University of Paris

Billington, David, civil engineer. Princeton University

Wehner, Rüdinger, zoologist and behavioral neurophysiologist. University of Zurich

Term Ending in 1994

Biggs, Peter M., veterinary scientist. President, United Kingdom Institute of Biology

Johnson, Barbara, literary critic. Harvard University

Panofsky, Wolfgang K. H., physicist. Committee on International Security and Arms Control, National Academy of Sciences; Stanford University

Term Ending in 1995

Doniger, Wendy, historian of religions. University of Chicago

Kon, Igor S., sociologist and ethnologist. USSR Academy of Pedagogical Sciences

Levine, Raphael D., chemical physicist. The Hebrew University of Jerusalem

Swaminathan, M. S., natural ecologist. President, National Academy of Sciences, India

Term Ending in 1996

Lloyd, Geoffrey E. R., Professor of Ancient Philosophy and Science and Master of Darwin College, Cambridge University

Myers, Norman, consultant scientist on conservation and management of tropical diversity

Rowlinson, John Shipley, chemical engineer, Oxford University

CENTER FOR APPLIED MATHEMATICS

305 Sage Hall (255-4335)

The Center for Applied Mathematics administers a broadly based interdepartmental graduate program that provides opportunities for study and research over a wide range of the mathematical sciences. Each student develops a solid foundation in analysis, algebra, and methods of applied mathematics. The remainder of the graduate student's program is designed by the student and his or her Special Committee. For detailed information on opportunities for graduate study in applied mathematics, students should contact the director of the Center for Applied Mathematics, Sage Hall.

There is no special undergraduate degree program in applied mathematics. Undergraduate students interested in an application-oriented program in mathematics may select an appropriate program in the Department of Mathematics, the Department of Computer Science, or some department of the College of Engineering.

Graduate students in the center take courses related to their program of study that are offered by various departments. Below are listed selected courses in applied mathematics in the main areas of research interest of the center's members. Detailed descriptions of these courses can be found in the listings of the individual departments (Abbreviations: Bio S = Biological Sciences, Chem E = Chemical Engineering, CS = Computer Science, EE = Electrical Engineering, M&AE = Mechanical and Aerospace Engineering, OR&IE = Operations Research and Industrial Engineering, and T&AM = Theoretical and Applied Mechanics.)

Selected Applied Mathematics Courses

Basic Graduate Courses in Applied Mathematics (and Analysis)

Math 413–414 Introduction to Analysis
Math 433–434 Introduction to Algebra
Math 511–512 Real and Complex Analysis
Math 521 Measure Theory and Lebesgue Integration
Math 522 Applied Functional Analysis
Math 531–532 Algebra
Math 551 Introductory Algebraic Topology
Math 515–516 Mathematical Methods in Physics
T&AM 612–613 Methods of Applied Mathematics

Analysis (and Differential Equations)

Math 427 Ordinary Differential Equations
Math 517 Dynamical Systems
Math 518 Smooth Ergodic Theory
Math 519–520 (also Math 428) Partial Differential Equations
Math 552 Differentiable Manifolds
Math 611–612 Seminar in Analysis
Math 613 Functional Analysis
Math 615 Fourier Analysis
Math 622 Riemann Surfaces
Math 623 Several Complex Variables
Math 627–628 Seminar in Partial Differential Equations

Logic and Theory of Computing

CS 671 Introduction to Automated Reasoning
CS 682 Theory of Computing
CS 715 Seminar in Programming Refinement Logics
Math 486 Applied Logic I
Math 487 Applied Logic II
Math 581 Logic
Math 681–682 Seminar in Logic
Math 683 Model Theory
Math 684 Recursion Theory
Math 685 Metamathematics
Math 687 Set Theory
Math 688 Topics in Applied Logic

Discrete and Numerical Mathematics

CS 621 Matrix Computations
CS 622 Numerical Optimization and Nonlinear Algebraic Equations
CS 624 Numerical Methods for Differential Equations
CS 681 Analysis of Algorithms
CS 721–722 Advanced Topics in Numerical Analysis
CS 729 Seminar in Numerical Analysis
EE 543 VLSI Architectures and Algorithms
Math 425 Numerical Solution of Differential Equations
Math 627–628 Seminar in Partial Differential Equations
Math 655 (also CS 655) Mathematical Foundations for Computer Modeling and Simulation
OR&IE 627 Dynamic Programming

OR&IE 630–631 Mathematical Programming I and II
OR&IE 632 Nonlinear Programming
OR&IE 633 Graph Theory and Network Flows
OR&IE 634 Combinatorial Optimization
OR&IE 635 Interior-Point Methods for Mathematical Programming
OR&IE 636 Integer Programming
OR&IE 639 Convex Analysis

Information Communication and Control Theory

EE 411 Random Signals in Communications and Signal Processing
EE 425 Digital Signal Processing
EE 468 Communication Theory
EE 521 Theory of Linear Systems
EE 522 Theory of Nonlinear Systems
EE 526 Advanced Signal Processing
EE 528 Multisensor Digital Signal Processing
EE 561 Error Control Codes
EE 562 Fundamental Information Theory
EE 567 Digital Communication
EE 573 Optimal Control and Estimation for Continuous Systems
EE 574 Estimation and Control in Discrete Linear Systems

Mathematical Biology

Bio S 662 Mathematical Ecology
Stat & Biom 451 Mathematical Modeling of Populations

Mathematical Economics

Econ 519 Econometrics I
Econ 520 Econometrics II
Econ 610 Stochastic Economics: Concepts and Techniques
Econ 617–618 Mathematical Economics
Econ 619–620 Advanced Topics in Econometrics

Mechanics and Dynamics

Chem E 731 Advanced Fluid Mechanics and Heat Transfer
Chem E 734 Fluid Mechanics in Suspensions
Chem E 751 Mathematical Methods of Chemical Engineering Analysis
Chem E 753 Analysis of Nonlinear Engineering Systems: Stability, Bifurcation, and Continuation
EE 681 (also A&EP 761) Kinetic Theory
M&AE 601 Foundations of Fluid Dynamics and Aerodynamics
M&AE 602 Incompressible Aerodynamics
M&AE 603 Compressible Aerodynamics
M&AE 704 Viscous Flows
M&AE 732 Analysis of Turbulent Flows
M&AE 733 Stability of Fluid Flow
M&AE 734 Turbulence and Turbulent Flow
M&AE 736 Computational Aerodynamics
M&AE 737 Computational Fluid Mechanics and Heat Transfer
T&AM 570 Intermediate Dynamics
T&AM 671 Advanced Dynamics
T&AM 672 Celestial Mechanics (also Astro 579)
T&AM 673 Mechanics of the Solar System (also Astro 571)
T&AM 675 Nonlinear Vibrations
T&AM 751 Continuum Mechanics and Thermodynamics
T&AM 752 Nonlinear Elasticity
T&AM 776 Applied Dynamical Systems

Probability and Statistics

EE 562 Fundamental Information Theory
EE 563 Communication Networks
EE 564 Decision Making and Estimation
EE 566 Queuing Networks
EE 664 Foundations of Inference and Decision Making
Math 571–572 Probability Theory
Math 573 Experimental Design and Multivariate Analysis
Math 574 Probability and Statistics
Math 575 Sequential Analysis, Multiple Decision Problems
Math 577 Nonparametric Statistics
Math 670 Topics in Statistics
Math 674 Multivariate Analysis
Math 675 Statistical Decision Theory
Math 677–678 Stochastic Processes
OR&IE 561 Queuing Theory and Its Applications
OR&IE 563 Applied Time-Series Analysis
OR&IE 650 Applied Stochastic Processes
OR&IE 651 Applied Probability
OR&IE 662 Advanced Stochastic Processes
OR&IE 663 Time-Series Analysis
OR&IE 665 Advanced Queuing Theory
OR&IE 670 Statistical Principles
OR&IE 671 Intermediate Applied Statistics
OR&IE 674 Design of Experiments
OR&IE 675 Statistical Analysis of Discrete Data
OR&IE 676 Statistical Analysis of Life Data

Theoretical/Mathematical Physics/Chemistry

Chem 792 Molecular Collision Theory
Chem 793 Quantum Mechanics I
Chem 794 Quantum Mechanics II
EE 407 Quantum Mechanics and Applications
Phys 553–554 (Astro 509-510) General Relativity
Phys 572 Quantum Mechanics I
Phys 574 Quantum Mechanics II
Phys 561 Classical Electrodynamics
Phys 562 (Chem 796) Statistical Mechanics
Phys 563 Statistical Physics
Phys 651 Advanced Quantum Mechanics
Phys 652 Quantum Field Theory

CENTER FOR THE ENVIRONMENT

425 Hollister Hall (255-7535)

The Center for the Environment is a campuswide center that promotes and coordinates interdisciplinary research, teaching, and outreach activities on environmental issues. CfE's major programs are (1) the Cornell Laboratory for Environmental Applications of Remote Sensing (CLEARS), which conducts teaching, research, and outreach activities on remote sensing and resource inventory and analysis; (2) the Water Resources Institute, which conducts research and public service activities related to water quality and supply; (3) the Waste Management Institute, which conducts research and outreach on waste-management issues; (4) the Environmental Policy Program, which addresses the policy aspects of issues such as biotechnology, hazardous waste management, and regulation of toxic substances; (5) the Global Environment Program, which conducts research on environmental problems at the global scale such as climate change, stratospheric ozone depletion, and trans-boundary air pollution; and (6) the Biological Resources Program, which coordinates and conducts research activities on the conservation, regulation, and management of biological resources, especially in marine environments.

Courses

Courses related to CfE programs are offered in a number of departments: (1) ecosystems science through the Section of Ecology and Systematics and the Department of Natural Resources; (2) remote sensing through the departments of Civil and Environmental Engineering and Soil, Crop, and Atmospheric Sciences; (3) water resources primarily through the departments of Agricultural and Biological Engineering; Soil, Crop and Atmospheric Sciences; and Civil and Environmental Engineering; (4) waste management primarily through the departments of Environmental Engineering, Agricultural and Biological Engineering, and Agricultural Economics; (5) environmental policy through Toxicology, Natural Resources, and City and Regional Planning; (6) and biological resources through the Division of Biological Sciences.

Material relevant to global environmental issues is covered by courses in several departments, including Environmental Engineering, Mechanical and Aerospace Engineering, Agricultural Engineering, Geology, Natural Resources, Rural Sociology, Agricultural Economics, and the Section of Ecology and Systematics.

Because courses relating to environmental policy are not indexed by that title, representative courses are listed below that should be of interest to those who would like to study environmental policy.

Religion, Ethics, and the Environment (Natural Resources 407)
Policy, Planning and Administration (Natural Resources 608)
Seminar in Environmental Values (Natural Resources 611)
Environmental Policy (Natural Resources 661)
Legal Aspects of Land-Use Planning (City and Regional Planning 653)
Land Resources Protection Law (City and Regional Planning 656)
Public Policy and Preservation Planning (City and Regional Planning 665)
Environmental Politics (City and Regional Planning 480)
Environmental Ethics (Philosophy 246 and Biological Sciences 206)
Economic Analysis of Government (Civil and Environmental Engineering 322 and Economics 308)
Risk Management of Toxic Chemicals (Biological Sciences 659)

THE MARIO EINAUDI CENTER FOR INTERNATIONAL STUDIES

170 Uris Hall (255-6370)

The Mario Einaudi Center for International Studies was established in 1961 to encourage, coordinate, and support comparative and interdisciplinary research on international subjects and was named for its founder in 1991. In a mutually dependent world, international problems require interdisciplinary collaboration, and the Einaudi Center coordinates and assists such collaborative efforts both on campus and in the field. Charged with the responsibility of furthering international and comparative research and teaching—involving efforts in almost every unit of the university—over the past three decades, the center has evolved into an administrative focus for more than twenty international programs.

The Mario Einaudi Center for International Studies at Cornell is one of the largest and most diverse in the United States. Currently it

oversees five Title VI National Resource Centers (Africa, Latin American Studies, South Asia, Southeast Asia, and Western Societies), as well as sixteen topical programs and the university study-abroad program. Over 500 faculty voluntarily collaborate in the center's programs and well over 300 graduate students are involved directly in its international programs. Undergraduate concentrations in International Relations and Modern European Societies serve 285 students.

Cornell is committed to the application and expansion of its resources to study the global community in all its complexity. These resources include a faculty of preeminent scholars and teachers, excellent research facilities, ability to teach forty-five languages, and a library system with more than 2,500,000 volumes on topics related to international and comparative studies.

As the world changes, Cornell's international programs change to study those developments. In addition to area studies, these programs focus on topics as varied and vital as international marketing, agriculture, nutrition, population, law, planning, politics, rural development economics, and world peace. These areas and topics change as interest, demand, and potential warrant. As one program gains enough momentum and recognition to attract its own resources, the center applies its resources to another pilot activity that brings faculty and students together across customary professional and departmental boundaries.

In addition, the Einaudi Center was recently given responsibility by the university to redesign and expand foreign study options for Cornellians, which has resulted in our Cornell Abroad Program. The center also encourages international research and travel by students through its annual Travel Grant Program.

Although the center has both an endowment and an appropriation from the university to support interdisciplinary international studies, Cornell monies are only a fraction of the total funds involved in international studies at Cornell. Programs seek funding from foundations, the federal government, alumni, and international agencies, a process that the center assists with as necessary. When particular programs are in a low budget cycle, rather than allowing them to lapse, the center continues to support those that show promise to keep the voluntary faculty groups operating together until new outside funding can be acquired. The center is also responsible for the International Students and Scholars office.

For additional information on current programs, publications, and courses, contact

Director
Mario Einaudi Center for International Studies
Cornell University
170 Uris Hall
Ithaca, New York 14853-7601
USA 607/255-6370
FAX 607/254-5000

The Einaudi Center Area Programs and Topical Studies Programs

Center Administration
Davydd J. Greenwood, Director
John M. Kubiak, Executive Director
170 Uris Hall
(607) 255-6370

Area Studies Programs

East Asia Program
(Formerly China-Japan Program)
Thomas Lyons, Director
140 Uris Hall

Soviet and East European Studies Program
Michael Scammell, Director
236 Goldwin Smith Hall

Latin American Studies Program
Billie Jean Isbell, Director
David Block, Acting Director
190 Uris Hall

South Asia Program
Dan Gold, Director
170 Uris Hall

Southeast Asia Program
Randy Barker, Director
120 Uris Hall

Western Societies Program
William Lesser, Director
130 Uris Hall

Institute for African Development
David Lewis, Director
203 West Sibley Hall

Topical Studies Programs

NY State Center for International Marketing
Davydd J. Greenwood, Director
170 Uris Hall

International Agriculture
Norman Uphoff
350 Caldwell Hall

International Legal Studies
John Barcelò, Director
318 Myron Taylor Hall

International Political Economy
Philip McMichael, Director
437A Warren Hall

Population and Development Program
J. Mayone Stycos, Director
218A Warren Hall

International Studies in Planning
William Goldsmith, Director
200 West Sibley Hall

Peace Studies Program
Judith Reppy, Director
180 Uris Hall

Program in International Nutrition
Michael Latham, Director
127 Savage Hall

Program on Comparative Economic Development
Erik Thorbecke, Director
350 Caldwell Hall

Cornell International Institute for Food, Agriculture, and Development
Norman T. Uphoff, Chair
350 Caldwell Hall

International Development and Women
Lourdes Beneria, Director
33 Warren Hall

Cornell Food and Nutrition Policy Program
Per Pinstrup-Andersen, Director
305 Savage Hall

Current programs coordinated by the Einaudi Center include the following:

Master of Professional Studies in International Development
Norman Uphoff, Field Representative
350 Caldwell Hall

A program intended for midcareer practitioners is sponsored by the center and leads to a Master of Professional Studies in International Development. Interested individuals should apply through the Graduate School.

Program on International Relations
Peter Katzenstein
Walter S. Carpenter Professor of International Studies
160 Uris Hall

Undergraduates interested in an international relations concentration should see Professor Katzenstein.

CENTER FOR STATISTICS

482 Caldwell Hall (255-8066)

The Cornell Center for Statistics coordinates university-wide activities in statistics and probability at the graduate and research level. Students interested in graduate study in probability and statistics can apply to the Field of Statistics or to one of the other graduate fields of study that offer related course work.

Students in the Field of Statistics plan their graduate program with the assistance of their Special Committee. For detailed information on opportunities for graduate study in statistics and probability, students should contact the director of the Statistics Center, 272 Caldwell Hall.

Graduate students can design many different programs within the Field of Statistics. These can be broadly grouped as follows: biometry, biostatistics, economic and social statistics, operations research, probability theory, sampling theory, statistical computing, statistical design, statistical theory, and stochastic processes and their applications.

Below are listed selected courses in probability and statistics of interest to graduate students in the field.

Economics

519 Econometrics I

520 Econometrics II

619 Topics in Econometrics I

620 Topics in Econometrics II

Electrical Engineering

411 Random Signals

468 Communication Systems I

561 Error Control Codes

562 Fundamental Information Theory

563 Communication Networks

564 Decision Making and Estimation

567 Communication Systems II

577 Artificial Neural Networks

663 Advanced Topics in Information Theory

664 Foundations of Probability

Industrial and Labor Relations

310 Design of Sample Surveys

312 Applied Regression Methods

410 Techniques of Multivariate Analysis

411 Statistical Analysis of Qualitative Data

510–511 Introductory Statistics for the Social Sciences

610 Seminar in Modern Data Analysis

612 Statistical Classification Methods

711 Sensitivity Analysis in Linear Regression

712 Theory of Sampling

713 Empirical Processes with a Statistical Application

714 Modern Distribution Theory

Mathematics

471 Basic Probability

472 Statistics

571–572 Probability Theory

573 Multivariate Analysis

574 Mathematical Statistics

670 Topics in Statistics

Operations Research

561 Queuing Theory and Its Application

562 Inventory Theory

563 Applied Time Series Analysis

565 Statistics for Manufacturing

570 Introduction to Statistical Theory with Engineering Applications

577 Quality Control

580 Design and Analysis of Simulated Systems

630–631 Mathematical Programming I and II

650 Applied Stochastic Processes

651 Probability

662 Advanced Stochastic Processes

663 Time-Series Analysis

665 Advanced Queuing Theory

670 Applied Statistics

671 Intermediate Applied Statistics

674 Design of Experiments

676 Statistical Analysis of Life Data

678 Asymptotic Methods in Statistics

680 Simulation

769 Selected Topics in Applied Probability

Statistics and Biometry

408 Theory of Probability

409 Theory of Statistics

417 Matrix Algebra

451 Mathematical Modeling of Populations

601–604 Statistical Methods I, II, III, and IV

606 Sampling Biological Populations

662 Mathematical Ecology

697 Special Problems in Statistics and Biometry

717 Linear Models

795 Statistical Consulting

COGNITIVE STUDIES

225 Uris Hall (255-6431)

Cognitive studies is a new and rapidly growing field of study that focuses on the nature and representation of knowledge. It approaches the study of perception, action, language, and thinking from several perspectives—theoretical, experimental, and computational—with the aim of gaining a better understanding of human cognition and the nature of intelligent systems. The comparison between human and artificial intelligence is an important theme, as is the nature of mental representations and their acquisition and use. Cognitive studies has drawn primarily from the disciplines of computer science, linguistics, philosophy, and psychology. In the College of Arts and Sciences the field of cognitive studies is primarily represented by faculty in these departments, as well as in mathematics. It is also represented by faculty in the Department of Human Development and Family Studies (College of Human Ecology), in the Section of Neurobiology and Behavior (Division of Biological Sciences), in the Department of Education (College of Agriculture and Life Sciences), and in the Johnson Graduate School of Management.

Undergraduate Programs

An undergraduate concentration in cognitive studies in the College of Arts and Sciences provides a framework for the design of structured, individualized programs of study in this growing interdisciplinary field. Such programs of study are intended to serve as complements to intensive course work in a single discipline as represented in an individual department. For further information on the undergraduate program, see "Cognitive Studies Concentration" in the College of Arts and Sciences section.

Graduate Programs

At the graduate level Cornell offers a graduate field minor in cognitive studies. Cornell's unique program of graduate training, which seeks to tailor an optimal program of study and research for each student, fosters highly interdisciplinary committees. It is the norm for students interested in cognitive studies to have faculty members from such departments as Philosophy, Computer Science, Modern Languages and Linguistics, and Psychology on common committees. For further information on the graduate Field of Cognitive Studies, contact Barbara Lust, graduate faculty representative, NG28 Van Rensselaer Hall (telephone: 607/255-0829).

Courses

Courses from across the university that are relevant to the Cognitive Studies program are listed in this catalog under Arts and Sciences in the section "Special Programs and Interdisciplinary Studies."

CORNELL ABROAD

474 Uris Hall (255-6224)

Cornell Abroad offers undergraduates a wide variety of academic programs that are intellectually challenging, academically and socially diverse, and culturally enriching. Study abroad is an integral part of students' formal education complementing and enhancing their study in Ithaca. Qualified students may study abroad by attending a program sponsored directly by Cornell or another American institution, or by enrolling in a foreign university. *In all cases students must enroll through Cornell Abroad.*

LOCATIONS ABROAD

Cornell undergraduates regularly study in approximately 40 different countries and enroll in more than 200 programs and universities throughout the world. In addition to a challenging course of study at a foreign university, the programs offer the experience of immersion in the life and culture of the host country.

Cornell has programs or affiliations with the following universities or programs:

ASIA

China: Peking and Nanjing Universities, Chinese Language and Study Programs, University of International Business and Economics: Chinese Business and Society Program (CIEE); Xiamen University, PRC (Cornell Abroad)

Japan: Kyoto Center for Japanese Studies (Stanford University Consortium); Inter-University Center for Japanese Language Studies

Korea: Yonsei University, Seoul

Sri Lanka: ISLE Program: Intercollegiate Sri Lanka Education

Indonesia: Institut Keguruan Dan Ilmu Pendidikan (IKIP) in Malang (CIEE)

AUSTRALIA: Curtin University of Technology, Perth; Griffith University, Brisbane; University of Sydney; University of Adelaide; University of New South Wales, Macquarie University, Sydney; University of New England, Armidale; The University of Wollongong; University of Western Australia, Perth

EUROPE

Hungary: Budapest Center for European Studies

Russia: Cornell-Colgate Semester in Moscow; Leningrad State University (CIEE); School of Slavonic and East European Studies (SSEES) programs in various locations

Belgium: Université Catholique de Louvain (Le Département des Sciences Politiques et Sociales)

Denmark: International Study Program in Copenhagen (DIS)

France: Cornell-Duke EDUCO program: Université de Paris 7, Paris 1, Institut d'Études Politiques de Paris (Sciences Po); University of Paris: Critical Studies Program (CIEE)

Germany: Cornell at the University of Hamburg; Technische Universität Darmstadt

Ireland: University of Limerick; Trinity College, Dublin, Ireland

Italy: Bologna Cooperative Studies Program (Consortium); Cornell College of Art and Architecture Program in Rome; Intercollegiate Center for Classical Studies in Rome

Spain: Cornell-Michigan in Seville program (with three weeks in Madrid)

Sweden: Agricultural College of Sweden, Uppsala; The Swedish Program at the University of Stockholm

Switzerland: Cornell at the Université de Genève and affiliated institutes
United Kingdom: University of Birmingham; University of Bristol; Cambridge University; University of Edinburgh; University of Manchester; Oxford University; University of Reading; University of Sussex; University of Warwick
University of London: King's College, University College, Imperial College of Science and Technology, London School of Economics and Political Science, Queen Mary Westfield College, School of Oriental and African Studies, School of Slavonic and East European Studies

LATIN AMERICA AND THE CARIBBEAN

Honduras: Escuela Agrícola Panamericana (Zamorano)
Mexico: Instituto Tecnológico y de Estudios Superiores de Monterrey; Universidad de las Américas-Puebla (UDLA); Universidad Iberoamericana
Jamaica, Barbados, and Trinidad: University of the West Indies

MIDDLE EAST

Egypt: American University in Cairo
Israel: Bar Ilan University, Ben Gurion University, Development Study Center, Rehovot, Haifa University, Hebrew University of Jerusalem, Technion (Israel Institute of Technology), Tel Aviv University

Other Locations Abroad

Cornell students are not limited to the locations listed above. In recent years, they have also studied in Argentina, Austria, Brazil, Colombia, Costa Rica, Dominican Republic, Ecuador, Greece, India, Kenya, Nepal, New Zealand, Nigeria, the Philippines, Poland and Puerto Rico.

Externally Sponsored Programs or Enrollment in a Foreign University

Undergraduates also apply through Cornell Abroad to a wide variety of study abroad programs sponsored by other American colleges and to nonaffiliated foreign universities. Cornell Abroad forwards all applications to the programs or universities for the students. *Those attending programs or universities approved by their Cornell college remain registered at Cornell, receive credit for approved coursework, and continue to be eligible for financial aid.*

Who Studies Abroad

Cornell undergraduate students from all Cornell colleges and all majors are eligible to study abroad. Approximately 500 undergraduates study abroad each year. Since most Cornell colleges or schools require that students complete at least sixty hours of their undergraduate credit on the Cornell campus, students who transfer to Cornell as juniors generally cannot count study abroad credit toward their Cornell degree.

When Students Study Abroad

Cornell students may study abroad their sophomore, junior, or senior year. After weighing a number of considerations, many students find that their junior year is the most satisfactory time to study abroad. To ensure preparation for the program which best meets a student's needs, it is important to begin planning for study abroad early in the freshman year.

Transfer of Credits and Grades

Only students applying through Cornell Abroad will receive credit for their work abroad. Cornell Abroad has catalogs, program materials, course syllabi, and program evaluations to help students plan their studies abroad. As part of the application process, students must obtain approval of their academic plans from their college study abroad adviser listed at the end of this article.

While policies and procedures vary from one Cornell college or school to the next, all Cornell colleges and schools regularly accept credits for study abroad, normally 30 credits per year or 12–20 per semester when students have taken a full load according to the standards of the foreign institution. After their return, their college will review their work and make the final decision concerning transfer of credit. *The Cornell transcript will indicate the courses taken, the credits earned, and the foreign grades received. Cornell does not translate the grades earned abroad into American grades, and does not average them into the Cornell grade point average.*

Foreign Language Requirements

Many programs abroad require two years or the equivalent of college-level language study. Students should make firm plans for foreign language study early in their freshman year if they would like to study in a country in which English is not the primary language.

For students who do not have proficiency in a foreign language, there are still options outside of English-speaking countries. For example, Cornell Abroad sends students to programs taught in English in Belgium, Denmark, Egypt, France, Hong Kong, Indonesia, Israel, Italy, Japan, Korea, Netherlands, People's Republic of China, and Sweden. Many students in these programs do not start studying the country's language until they are abroad, but it is desirable to start studying the language at least a year before going abroad, if possible.

Length of Stay

Cornell students study abroad for one semester or the academic year. When possible, it is often desirable to study for the entire year. It takes time to adjust successfully to a different educational system, language, and culture. The full year provides a more complete immersion in the foreign country's academic life and culture. Students who are studying in foreign languages especially find it to be beneficial to study for a year. Many students at Cornell, however, find it necessary to limit their study abroad to one semester. Cornell Abroad has information on a number of strong semester programs.

Housing Arrangements

Students generally have the option of living with a selected family, in a university dormitory room, or in an apartment. Cornell Abroad will advise students of the arrangements that are available and most appropriate to their individual needs.

Admission and Application Procedure

All students who wish to receive Cornell credit for study abroad must fill out the Cornell Abroad application materials available in 474 Uris Hall. All application materials should be submitted to Cornell Abroad or, in the case of Human Ecology and Industrial and Labor Relations students, the college study abroad office. Cornell Abroad will forward all completed applications to the appropriate institutions.

Application Deadlines

Deadlines for Cornell affiliated programs

October 15, 1992 for spring term 1993 study abroad except in the case of British universities.

November 1, 1992 for 1993–94 at Oxford or Cambridge.

January 31, 1993 for the 1993–94 Kyoto Center for Japanese Studies program.

February 15, 1993 for studying in 1993–94 at most universities and in the spring semester 1994 at British universities, though British universities sometimes will consider applications for the spring semester as late as October 15 of the previous year.

Deadlines for external programs and direct enrollment

The application deadlines for external programs and direct enrollment in foreign universities vary by program. Students should submit complete application materials to Cornell Abroad three weeks before the program or university deadline.

Costs

When studying abroad, candidates for a Cornell degree pay the tuition of the foreign university or the specific program. Tuitions vary considerably by program. In addition, they continue to pay the regular Cornell University fee (*not* tuition), which is $1,685 per semester in 1992–93. Students studying in the United Kingdom and Israel pay an additional semester fee of $250 or $150, respectively, for the Cornell Centers there unless they are attending a program sponsored by another American university. Detailed information on costs is available at the Cornell Abroad office.

Financial Aid

All student going abroad, whether through a Cornell program or a program sponsored by another institution, are eligible for financial aid as consistent with general university policy.

Security Abroad and Related Issues

The decision to study in a particular region of the world must be made by each student and his or her family in light of their own interpretation of the events and their willingness to live with a certain degree of ambiguity. It is sad but true that nowhere in the world, including many of our own cities, can one expect a completely safe environment. Cornell Abroad cannot predict future events nor give guarantees about the course of events in any region of the world.

Cornell Abroad stays in regular contact with its representatives abroad and receives information regarding rapidly changing political situations through the State Department and

its other contacts. As long as the State Department does not restrict travel to a particular place, Cornell Abroad does not recommend limitations on travel or student plans for study abroad. Cornell Abroad will try to notify its students immediately that they should defer their travel abroad, should such Department of State travel restrictions be issued. Nothing is as important as the security and well-being of our students.

Responsibility for a decision to withdraw from a program or return home early rests with the individual and his or her family. There can be no guarantee of credit for students who withdraw from programs before the completion of scheduled instruction and examinations. Students attending programs sponsored by colleges and universities other than Cornell are advised to inquire about those institutions' policies regarding the completion of academic work and the potential financial implications of a premature departure. In the event of a disruption requiring a premature departure, refunds of tuition and fees, and the appropriate number of credits to be awarded, will be reviewed by Cornell and its affiliated institutions on a case-by-case basis. Most institutions sponsoring study abroad programs strive to facilitate the students' completion of their academic programs even under unusual circumstances and have tuition refund policies that contain a pro-rated formula used in the event of such a disruption.

Sources of Information and Advice Concerning Study Abroad

Cornell Abroad (for students from all colleges): Urbain J. DeWinter, Director and Adjunct Associate Professor of Romance Studies; Cynthia J. Koepp, Associate Director; Elizabeth R. Okihiro, Administrative Aide; and Kathy Lynch, Accounts Coordinator, 474 Uris Hall.

In addition to individual advising, Cornell Abroad offers catalogs, program materials, course syllabi, program evaluations, books, videotapes, and a series of information meetings that are advertised in the *Cornell Daily Sun.*

College study abroad advisers:

Agriculture and Life Sciences: Donald Burgett, 140 Roberts Hall

Architecture, Art, and Planning: Phyllis Thibodeau, 129 Sibley, and Professor Roberto Bertoia, Foundry;

Arts and Sciences: Professor Beatrice Rosenberg, 55 Goldwin Smith Hall;

Engineering: Associate Dean Richard Lance, 322 Thurston Hall;

Hotel Administration: Professor William H. Kaven, 545F Statler Hall;

Human Ecology: Dwight Giles, 170B Martha Van Rensselaer Hall;

Industrial and Labor Relations: Laura Lewis, 101 Ives Hall.

CORNELL-IN-WASHINGTON PROGRAM

131A Sage Hall (255-4090)

The Cornell-in-Washington Program offers students from all colleges within the university an opportunity to earn full academic credit for a semester in Washington, D.C. Students take courses from Cornell faculty, conduct individual research or design projects, and work as externs. The program is administered by the director with the assistance of a university-wide faculty steering committee, which reports to the Vice President for Academic Programs and Campus Affairs.

The program is housed at the Cornell Center, 2148 O Street, NW, Washington, DC 20037. The academic and adminstrative space is located on the first floor; twenty-seven residential units for students and faculty are on the upper floors.

The Cornell-in-Washington public policy program is open to qualified juniors, seniors, and graduate students from all colleges, schools, and divisions of the university. Students enroll in Government 500 (cross-listed for statutory credit), which involves a major research project carried out in conjunction with an externship. Students may work as externs with congressional committee offices, executive-branch agencies, interest groups, research institutions and other organizations involved in the political process and public policy, among others. Students also select one or two other seminars from such fields as government, history, economics, architectural history, natural resources, and social policy. All seminars are taught by Cornell faculty and carry appropriate credit toward fulfillment of major, distribution, and other academic requirements.

Tuition

Students are registered as full-time students, earn Cornell credit, pay full tuition, and remain eligible for financial aid.

Housing

Apartments may be rented at the Cornell Center during the academic year and during the summer. All are fully furnished (except for dishes, cookware, towels and bedding) and reasonably priced by both Washington and Cornell standards. Two students are assigned to each efficiency and three to each one-bedroom apartment. Because of the limited number of spaces and the need for accurate planning, a non-refundable deposit of $150 is required to reserve a space. Students are discouraged from bringing automobiles. The public transportation system, consisting of both bus and subway service, is extensive and convenient to the Center and street parking is not available.

Applications

Application forms are available from the Cornell-in-Washington office at 131A Sage Hall. Applications should be submitted the semester prior to participation and are acted on as soon as complete. Therefore, it is to the student's advantage to apply early.

Information

Regular information meetings are held on campus in early October and March. These meetings are advertised in the *Cornell Daily Sun* and on campus bulletin boards. Additional information concerning externships, courses, housing and other features of the program may be obtained at either the Cornell-in-Washington office at 131A Sage Hall (607) 255-4090, or in Washington at the Cornell Center, 2148 O Street, NW, Washington, DC 20037, (202) 466-2184.

CORNELL INSTITUTE FOR PUBLIC AFFAIRS

131A Sage Hall (255-4090)

Cornell's Institute for Public Affairs (CIPA) is now offering a five-year dual-degree program for Cornell students. Those enrolling in this program would remain in Ithaca a fifth year after the BA or BS and earn an MPA (Master of Public Administration) degree. A semester in the Cornell-in-Washington Program is recommended.

Cornell's MPA program seeks to provide students with:

- a thorough understanding of the political processes through which issues, problems, and policies are formulated and implemented;
- an understanding of the economic bases for government action, including both micro and macro economic techniques and problems;
- competence in the quantitative methods needed to analyze and evaluate programs and policies;
- familiarity with public budgets and finance;
- a thorough knowledge of the behavior and management of complex public and private organizations;
- sensitivity to the moral and ethical dimensions of policy questions;
- an understanding of the historical context and development of governmental programs.

Students interested in pursuing a career in public affairs in the government, the not-for-profit sector, or government-related activities in the private sector, may qualify to complete an MPA at Cornell with only one additional year of study. Additional information is available at the CIPA office, 131A Sage Hall, 255-4090.

CORNELL PLANTATIONS

One Plantations Road (255-3020)

A museum of living plants and natural history resources, Cornell Plantations encompasses the arboretum, botanical garden, and natural areas of Cornell University totaling nearly 3,000 acres that include the woodlands and gorges bordering the central campus. Plantations lands provide outdoor laboratories for academic programs and research in disciplines ranging from geology to landscape architecture. All accessioned plant specimens are labeled. The F. R. Newman Arboretum specializes in trees and shrubs native to New York State. The botanical garden features

herbs, flowers for cutting and drying, garden perennials, heritage and modern vegetables, international crops and weeds, rock garden plants, peonies, flowering groundcovers, rhododendrons and companion plants, and plants native to the Cayuga Lake Basin. Gardens on campus exhibit rhododendrons and azaleas, unusual plants for horticultural study, and poisonous plants. Orchids are displayed in the Daisy Farrand Solarium at A. D. White House. Nearly 2,700 acres of land in and around Tompkins County are set aside as nature preserves providing quality examples of native vegetation and protection for rare species and communities for class and research use. Faculty are asked to notify the Program Coordinator (255-9638) before scheduling class visits or beginning research. The Education Program offers non-credit courses, lecture series, symposia, special events, and interpretive tours. Students are encouraged to volunteer as photographers, authors, guides, and workers. Publications include the quarterly *Cornell Plantations*, newsletters, a semiannual insert in the *Cornell Chronicle*, and *Garden Pages* which provide interpretive materials for the collections. Research on locally endangered plant species is being conducted to provide management guidelines for conservation. In addition, a life science curriculum for elementary schools, LEAP, has been produced based on conceptual-development teaching methods. Maps, publications, and information are available at the garden gift shop in the Lewis Headquarters Building, Cornell Plantations, One Plantations Road, Ithaca, NY 14850-2799 (255-3020).

PROGRAM ON ETHICS AND PUBLIC LIFE

632 Clark Hall (255–3810)

The critical issues of public life are inescapably ethical issues. In the economy, we face questions of equity and justice and questions about the relation between prosperity, the environment, and the quality of individual lives. In constitutional law, we confront dilemmas about civil rights, freedom of speech, privacy, and abortion. In politics and government, we wrestle with questions about campaigning, character, and compromise. And in international affairs, we encounter the complexities of war and peace, human rights, multilateral aid, and climate change.

The university-wide Program on Ethics and Public Life (EPL) is Cornell's initiative in the systematic study of the ethical dimension of specific public issues. EPL grew out of a conviction that these questions need something more than abstract philosophical discussion. In addition to the general study of values and principles that goes on in theoretical ethics, universities need to foster ways of thinking about the complex, uncertain, and urgent problems of the real world, ways of thinking that are realistic without sacrificing anything of their ethical character.

EPL does not intend to create either an undergraduate major or a graduate field in Ethics and Public Life. On the contrary, we seek to enhance and facilitate the discussion of ethical issues by students whose central educational interests lie elsewhere, but whose work and lives will nevertheless confront them with dilemmas and responsibilities for which a university education should prepare them. EPL aims, not to create yet another specialized department, but to enrich existing departments with courses that are intellectually serious and practically fruitful at the same time.

EPL Core Courses

PHIL 247 Ethics and Public Life

PHIL 342 Law, Society, and Morality

PHIL 343 Political Obligation and Civil Disobedience

GOVT 412 Voting and Political Participation

GOVT 466/Womns 466/Law 648 Feminism and Gender Discrimination

GOVT 468/Phil 368 Global Climate and Global Justice

GOVT 469/Phil 369 Limiting War: The Morality of Modern State Violence

Related Courses

CEH 356 Economics of Welfare Policy

CLASS 118 Modern Moral Problems: Some Ancient Answers

CRP 642 Critical Theory and the Foundations of Planning Analysis

ENGR 360/S&TS 360 Engineering Ethics

ILR 482 Ethics at Work

ILR 488 Liberty and Justice for All

LAW 668 Lawyers and Clients

LAW 744 Lawyers and the Legal Profession

Henry Shue, director, 632 Clark Hall, 255–3810; Henry Shue, Wyn and William Y. Hutchinson Professor of Ethics and Public Life; Kathryn Abrams, Associate Professor of Ethics and Public Life and of Law.

HISPANIC AMERICAN STUDIES PROGRAM

211 Sage Hall (255-3197)

The Hispanic American Studies Program is an interdisciplinary academic program that focuses on the contributions, concerns, and welfare of those persons of Hispanic origin who reside in the United States. It includes support for historical, linguistic, literary, social, economic, and political studies of this diverse group of Americans. To this end the program objectives are (1) to expand the available course curriculum by providing both undergraduate and graduate courses pertaining to Hispanic American subject matters; (2) to enlarge the size of the Hispanic American faculty at Cornell through permanent appointments and visiting appointments; and (3) to enhance the Hispanic American academic environment on campus through support of such activities as lectures, conferences, seminars, exhibits, and research activities.

1992–93 Course Offerings

Because courses relating to Hispanic American Studies are not indexed by that title, courses of particular relevance are listed below. Please refer to the appropriate department for details.

ENGR 355: Understanding Cultural Differences in the Engineering Work Environment

HSS 280/ASR 280: Racism in American Society

HSS 370: Social Welfare as a Social Institution

ILR 469: Immigration and the American Labor Force

ILR 628: Cross-Cultural Studies in Organizational Behavior

SOC 265: Hispanic Americans

SPAND 204: Intermediate Composition and Conversation

SPAND 366/LING 366: Spanish in the United States

SPANL 311–312: Advanced Composition and Conversation

SPANL 332: The Modern Drama in Spanish America

SPANL 346: Hispanic Caribbean Culture and Literature

SPANL 390: Fiction of Modern Hispanic Women

SPANL 396: Modern US-Hispanic Prose Fiction

SPANL 397: Colombian Literature

SPANL 492: Latin American Women Writers

SPANL 105 FWS: Paradise Lost: Biculturalism in America

SPANL 106 FWS: Searching for Self in Hispanic fiction

SPANL 107 FWS: The Literature of U.S. Hispanic/Ethnic Women Writers

LING 113 FWS: Two Worlds—Dos Mundos

SPANL 119 FWS: Letters from el Barrio: A Sense of Place in Hispanic American Fiction

SPANL 125 FWS: The City in Hispanic Novels

SPANL 126 FWS: The Complex Fate: Self-Identity and Conflict in the United States Hispanic Literature

SPANL 210: Introduction to Hispanic American Studies

PROGRAM IN COMPARATIVE AND ENVIRONMENTAL TOXICOLOGY

16 Fernow Hall (255-8008 or 255-2163)

The Cornell Program in Comparative and Environmental Toxicology is coordinated and facilitated by the Institute for Comparative and Environmental Toxicology (ICET). ICET serves as a focal point for all research, teaching, and cooperative extension activities in the broad interdisciplinary area of environmental toxicology at Cornell and encourages the development of collaborative programs between faculty members in many university departments.

Graduate Studies

The major in the graduate Field of Environmental Toxicology promotes training leading to the M.S. or Ph.D. degrees and provides both breadth and depth in environmental toxicology and related disciplines. The

program offers a combination of research and didactic training that is designed to prepare students for solving the problems of modern toxicology. Specialization tracks include cellular and biochemical toxicology; nutritional toxicology; ecotoxicology and environmental chemistry; and risk assessment, management, and public policy. Research of the faculty associated with the program is focused on the interactions of drugs, pesticides, and other potentially hazardous environmental agents with a wide variety of living organisms (including humans) and with the ecosystems with which these organisms are associated.

Courses

Courses in environmental toxicology are cosponsored by the university academic departments and are open to all graduate students and to those undergraduates who have permission of the instructor. The titles and numbers of these courses are listed below, and details of course content are provided elsewhere in the catalog under the listings of the cosponsoring department. Further information concerning the program and the development of new courses may be obtained through the graduate faculty representative,
16 Fernow Hall (telephone: 255-8008).

Note: Bracketed courses are not offered 1992–93

Tox 370 Pesticides and the Environment (Entomology 370)

Tox 419 Animal Cytogenetics (Animal Science 419)

Tox 437 Oncogenic Cancer Viruses (Biological Sciences 437)

Tox 528 Pharmacology (Veterinary Medicine 528)

Tox 607 Ecotoxicology (Natural Resources 607)

Tox 610 Introductory Chemical and Environmental Toxicology (Food Science 610)

Tox 611 Molecular Toxicology (Nutritional Sciences 611)

Tox 621 Clinical Veterinary Toxicology (Veterinary Medicine 621)

Tox 640 Principles of Toxicological Pathology (Veterinary Medicine 640)

Tox 651 Nutrition and the Chemical Environment (Nutritional Sciences 651)

Tox 658 Risk Management of Toxic Chemicals (Biological Sciences 659 and Biology and Society 459)

Tox 660 Safety Evaluation in Public Health (VetPR 660)

Tox 690 Insect Toxicology and Insecticidal Chemistry (Entomology 690)

Tox 698 Current Topics in Environmental Toxicology (Nutritional Sciences 700, NatRes 698, Ag & Bio Eng 698)

Tox 702 Seminar in Toxicology

Tox 751 Professional Responsibilities of Toxicologists (Biological Sciences 751)

Tox 899 Master's Thesis and Research

Tox 999 Doctoral Thesis and Research

VISUAL STUDIES

B–63 McGraw Hall (255–6770)

Visual Studies as a distinct area of intellectual activity comprehends the analysis of visual forms, especially symbolic visual forms, from a range of historical, scientific, sociological, and aesthetic points of view. Images can be analyzed within a variety of contexts and by means of a variety of methods, and their study is therefore ideally conceived of in transdisciplinary terms. And since the creation of images has an important bearing on their analysis, visual studies concerns itself with practice as well as theory.

In addition to the courses listed below, which represent only a sampling of formal curricular offerings pertinent to visual studies, interested students should be aware of the programs and facilities available in the Herbert F. Johnson Museum of Art and the ETV Center of the College of Human Ecology, as well as the frequent showings by Cornell Cinema and Pentangle II.

Courses

Some of these courses may not be taught in 1992–93. For information about availability consult the appropriate departmental listings.

Art and Visual Thinking (Textiles and Apparel 125)
Blacks in Communication Media (Africana Studies 303)
Cinema and Society (German Studies 175)
Cinema to Literature (Italian 399)
Color, Form, Space (Art 110)
Computer Art (Art 171)
Computer Graphics (Architecture 374 and Computer Science 417)
Computer Vision (Electrical Engineering 547)
Design I and II (Design and Environmental Analysis 101–102)
Digital Image Analysis (Environmental Engineering 616)
Documenting the Depression: Film, Literature, and Memory (History 476)
Ethnographic Film (Anthropology 205)
Fiction and Film in France (French 499)
Film and Performance (Theatre Arts 311)
Forms of Hollywood Comedy (English 263)
Fundamentals of 16-mm Filmmaking (Theatre Arts 377)
Graphic Design (Design and Environmental Analysis 349)
History and Theory of Commercial Narrative Film (Theatre Arts 375)
The History of the Book (English 450)
Image Analysis I (Landforms) and II (Physical Environments) (Civil and Environmental Engineering 613–614)
Impact of Communication Technologies (Communication 626)
Introduction to Film Analysis: Meaning and Value (Theatre Arts 274)
Introduction to Mass Media (Communication 120)
Introductory Photo I (Art 161 and Architecture 251)
The Japanese Film (Asian Studies 313)
Literature to Cinema (Italian 390)
Machine Vision (Computer Science 664)
The Medieval Illuminated Book (History of Art 337)
Modern Experimental Optics (Physics 330)
Myth onto Film (Anthropology 653 and Theatre Arts 653)
New German Cinema (German Studies 676)
Perception (Psychology 205)
Photo Communication (Communication 234)
Psychology of Television (Human Development and Family Studies 364)
Psychology of Visual Communication (Psychology 347)
Public Aesthetics: Art, Video, and Spectacle in the Age of Technology (English 453)
Russian Film of the 1920s and French Film of the 1960s (Theatre Arts 378)
Seminar in Museum Issues (History of Art 407)
Seminar on Ethnographic Film (Anthropology and Theatre Arts 450)
Spanish Film (Spanish 399)
Video Communication (Communication 348)
Visual Communication (Communication 230)
Visual Ideology (German 660 and Theatre Arts 660)
Visual Perception (Psychology 305)
The Visual System (Neurobiology and Behavior 326)
Writing about Film (Theatre Arts 108 and English 108)

Business and Preprofessional Study

UNDERGRADUATE BUSINESS STUDY

Undergraduate preparation for business is found in many schools and colleges at Cornell. Students most frequently take courses in more than one area, as well as in related fields, to construct a program to suit their interests and career objectives. Each of the following areas provides a different focus for application and use of business study and training, and students should consider carefully the implications of each program when making a choice. (Graduate study is available in the Johnson Graduate School of Management as well as in graduate fields following each of the undergraduate options.)

The areas most often pursued include applied economics and business management (College of Agriculture and Life Sciences), economics (College of Arts and Sciences), engineering, hotel administration, consumer economics and housing (College of Human Ecology), and industrial and labor relations.

Applied economics and business management. This program is designed to prepare students for a career in business or in public service. Emphasis is placed on the application of economic theory and management principles. Students are required to satisfy the distribution requirements of the College of Agriculture and Life Sciences, which include courses in the social sciences and humanities. Areas of specialization include agribusiness management, business management and marketing, farm business management and finance, and food industry management.

Economics. This program provides a broad view of that social science concerned with the description and analysis of the production, distribution, and consumption of goods and services, the understanding of monetary systems, and the comprehension of economic theories and models. It is viewed more often as preprofessional than as training for immediate practice in business or economics.

Engineering. This area provides much of the management personnel of modern industry. Engineers frequently climb the ladders of technological management that lead to more

general management responsibilities; more than half of the management-level personnel of major corporations such as General Electric, Xerox, IBM, and Du Pont have engineering degrees. In addition to becoming managers by being effective technical supervisors, many students enter engineering explicitly anticipating graduate business education, judging that an engineering background is particularly appropriate for management in a technology-oriented society.

Hotel administration. The undergraduate program in hotel administration prepares individuals to be mid- to upper-level managers and entrepreneurs for the hospitality industry (lodging, food service, and travel) and allied fields. Instruction is provided in the areas of administration and general management, human-resources management, accounting and financial management, food and beverage management, law, properties management, communication, science and technology, economics, and marketing.

Consumer economics and housing. Study in the department develops an understanding of the market economy from both buyers' and sellers' perspectives. The focus is on the economic behavior and welfare of consumers in the private, public, and mixed sectors of the economy. An understanding of economics, sociology, and government policy provides the basis for an analysis of consumers' rights and responsibilities.

Industrial and labor relations focuses on the interactions among human beings, organizations, and institutions. It encompasses not only the relationships between employer and employee but the political, economic, social, and psychological factors that affect those relationships. It includes the study of the hiring, training, and motivating of individual workers; negotiation and conflict resolution; and the economic and technological changes that affect the jobs that people perform. Finally, it embraces the many regulations and regulatory agencies created by our society to protect and help both employer and employed.

Related Areas

Courses in areas directly related to these business programs are found in many of the university departments. For example, quantitative methods may be studied in the departments of Mathematics and Computer Science, and courses in public administration are found in the departments of Government, and City and Regional Planning. There are additional programs that allow students with an interest in business to focus on a particular geographic area. Examples are the Latin American Studies Program, the South Asia Program, and the Africana Studies and Research Center. Such interdisciplinary programs as the Program on Science, Technology, and Society and the various programs in international agriculture provide additional opportunities for study of interest to business students.

Combined Degree Programs

Because Cornell has the Samuel Curtis Johnson Graduate School of Management, special opportunities exist for highly qualified undergraduates to combine their undergraduate programs with graduate study in that school. Students in the double-registrant program generally receive a bachelor's degree after four years of study and a Master of Business Administration (M.B.A.) degree after the fifth year of study, rather than the usual sixth year. Students in all Cornell undergraduate colleges and schools are eligible to explore this option. There is also a program with the College of Engineering that allows qualified students to earn a B.S., M.B.A., and Master of Engineering degree in six years. Admission to these combined degree programs is limited to particularly promising applicants. Careful planning is required for successful integration of the work in the two schools.

SELECTED BUSINESS AND MANAGEMENT COURSES

Accounting

Ag Ec 221 Financial Accounting
Ag Ec 323 Managerial Accounting
H Adm 120 Survey of Financial Management
H Adm 226 Financial Management
JGSM NBA 500 Intermediate Accounting
JGSM NBA 501 Advanced Accounting
JGSM NBA 505 Auditing
OR&IE 350 Cost Accounting Analysis and Control

Communications

Comm 201 Oral Communication
Comm 204 Effective Listening
Comm 272 Principles of Public Relations and Advertising
Comm 301 Business and Professional Speaking
Comm 372 Advanced Advertising
H Adm 165 Managerial Communication: Writing Principles and Procedures
H Adm 364 Advanced Business Writing

Computing

Ag Ec 412 Introduction to Mathematical Programming
Ag Ec 413 Information Systems and Decision Analysis
ABEN 204 Introduction to Computer Uses
COMS 100 Introduction to Computer Programming
COMS 101 The Computer Age
COMS 102 Introduction to Microcomputer Applications
Educ 247 Instructional Applications of the Microcomputer
H Adm 174 Microcomputing
H Adm 374 End-User Business Computing Tools
H Adm 375 Hotel Computing Applications

Economics

Ag Ec 332 Economics of the Public Sector
Ag Ec 450 Resource Economics
CEE 321 Microeconomic Analysis
CEH 355 Wealth and Income
Econ 101 Introductory Microeconomics
Econ 102 Introductory Macroeconomics
Econ 314 Intermediate Microeconomic Theory
Econ 317 Intermediate Mathematical Economics I
Econ 318 Intermediate Mathematical Economics II
Econ 351 Industrial Organization
ILRIC 240 Economics of Wages and Employment
ILRIC 340 Economic Security

Entrepreneurship

Ag Ec 325 Personal Enterprise and Small Business Management
Ag Ec 425 Small Business Counseling
JGSM NBA 300 Entrepreneurship and Enterprise

Finance

Ag Ec 324 Financial Management
Ag Ec 404 Advanced Agricultural Finance Seminar
Ag Ec 405 Farm Finance
Ag Ec 407 Financial Management in Farming
CEH 315 Personal Financial Management
Econ 331 Money and Credit
Econ 333 Theory and Practice of Asset Markets
Econ 336 Public Finance: Resource Allocation
H Adm 125 Finance
H Adm 322 Investment Management
H Adm 326 Corporate Finance
OR&IE 451 Economic Analysis of Engineering Systems

International Business

Ag Ec 100 Introduction to Global Economic Issues
Ag Ec 444 Export Marketing
Econ 102 Introductory Macroeconomics
Econ 313 Intermediate Macroeconomics Theory
Econ 325 Economic History of Latin America
Econ 366 The Economy of the Soviet Union
Econ 369 Selected Topics in Socialist Economies: China
Econ 661 International Trade Theory and Policy
Econ 362 International Monetary Theory and Policy

Law, Regulation, and Ethics

Ag Ec 252 Natural Resource and Environmental Economics
Ag Ec 320 Business Law I
Ag Ec 321 Business Law II
Ag Ec 322 Taxation in Business and Personal Decision Making
Ag Ec 420 Advanced Business Law
Ag Ec 422 Estate Planning
Comm 428 Communication Law
Econ 302 The Impact and Control of Technological Change
Econ 304 Economics and the Law
Econ 308 Economic Analysis of Government (also Civil and Environmental Engineering 322)
Econ 354 Economics of Regulation
Econ 552 Public Regulation of Business
Educ 477 Law and Educational Policy
Govt 389 International Law
H Adm 422 Taxation and Management Decisions
I&LR 201 Labor Relations Law and Legislation
ILRIC 330 Comparative Industrial Relations Systems: Western Europe
ILRIC 331 Comparative Industrial Relations Systems: Non-Western Countries

Management

Ag Ec 220 Introduction to Business Management
Ag Ec 302 Farm Business Management
Ag Ec 402 Advanced Farm Business Management
Ag Ec 424 Business Policy

Ag Ec 426 Cooperative Management and Strategies
Ag Ec 443 Food Industry Management
Econ 326 History of American Business Enterprise
H Adm 103 Principles of Management

Manufacturing

Econ 302 The Impact and Control of Technological Change
OR&IE 410 Industrial Systems Analysis
OR&IE 421 Production Planning and Control

Marketing

Ag Ec 240 Marketing
Ag Ec 342 Marketing Management
Ag Ec 346 Dairy Markets and Policy
Ag Ec 347 Marketing Fruits, Vegetables, and Ornamental Products
Ag Ec 448 Food Merchandising
Ag Ec 449 Applications in Strategic Marketing
CEH 233 Marketing and the Consumer
H Adm 243 Principles of Marketing

Personnel and Human Resource Management

Econ 381 Economics of Participation and Workers' Management
Econ 382 The Practice and Implementation of Self-Management
H Adm 211 The Management of Human Resources
H Adm 212 Human Relations Skills
H Adm 414 Organizational Behavior and Small-Group Processes
ILROB 120 Introduction to Macro Organizational Behavior and Analysis
ILROB 121 Introduction to Micro Organizational Behavior and Analysis
ILRPR 260 Personnel Management
ILRPR 360 Human Resource Economics and Public Policy
ILROB 370 The Study of Work Motivation
ILROB 373 Organizational Behavior Simulations
ILROB 374 Technology and the Worker
ILROB 420 Group Processes
ILROB 425 Sociology of Industrial Conflict
ILRPR 461 Human Resource Managment (I&LR 200 Collective Bargaining)

Quantitative Decisions and Decision Science

Ag Ec 310 Introductory Statistics
Ag Ec 408 Seminar in Farm Business Decision Making
Ag Ec 410 Business Statistics
Ag Ec 413 Information Systems and Business Analysis
CEE 304 Uncertainty Analysis in Engineering
CEE 323 Engineering Economics and Management
Econ 320 Introduction to Econometrics
Econ 520 Econometrics II
CEH 330 Economics of Consumer Policy
ENG 270 Basic Engineering Probability and Statistics

Real Estate

Ag Ec 406 Farm and Rural Real Estate Appraisal
CRP 664 Economics and Financing of Neighborhood Conservation and Preservation
H Adm 323 Hospitality Real Estate Finance
H Adm 350 Real Estate Management

Transportation

CEE 361 Introduction to Transportation Engineering
CEE 660 Transportation Planning and Policy

PRELAW STUDY

Law schools do not prescribe any particular prelaw program, nor do they require any specific undergraduate courses as do medical schools. Law touches nearly every phase of human activity, and there is practically no subject that cannot be considered of value to the lawyer. Therefore, no undergraduate course of study is totally inappropriate. Students contemplating legal careers should be guided by certain principles, however, when selecting college courses.

1. Interest encourages scholarship, and students will derive the greatest benefit from those studies that stimulate their interest.
2. Of first importance to the lawyer is the ability to express thoughts clearly and cogently in both speech and writing. Freshman writing seminars, required of nearly all Cornell freshmen, are designed to develop these skills. English literature and composition, and communication courses, also serve this purpose. Logic and mathematics develop exactness of thought. Also of value are economics, history, government, and sociology, because of their close relation to law and their influence on its development and ethics, and philosophy, because of the influence of philosophic reasoning on legal reasoning and jurisprudence. Psychology leads to an understanding of human nature and mental behavior. Some knowledge of the principles of accounting and of the sciences such as chemistry, physics, biology, and engineering is recommended and will prove of practical value to the lawyer in general practice in the modern world.
3. Cultural subjects, though they may have no direct bearing on law or a legal career, will expand students' interests; help cultivate a wider appreciation of literature, art, and music; and make better-educated and well-rounded persons.
4. Certain subjects are especially useful in specialized legal careers. For some, a broad scientific background—for example, in agriculture, chemistry, physics, or engineering—when coupled with training in law, may furnish qualifications necessary for specialized work with the government, for counseling certain types of businesses, or for a career as a patent lawyer. A business background may be helpful for those planning to specialize in corporate or tax practice. Students who anticipate practice involving labor law and legislation might consider undergraduate study in the School of Industrial and Labor Relations. Whatever course of study is chosen, the important goals are to acquire perspective, social awareness, and a critical cast of mind; to develop the ability to think logically and analytically; and to express thoughts clearly and forcefully. These are the crucial tools for a sound legal education and a successful career.

   The presence of the Cornell Law School on campus provides the opportunity for a limited number of highly qualified undergraduates registered in the College of Arts and Sciences at the university to be admitted to the Law School. At the time of entry they must have completed 105 of the 120 credits required for the Bachelor of Arts degree, including 92 credits of course work in the College of Arts and Sciences.

   It may be possible for exceptionally well-qualified students in other Cornell undergraduate colleges to arrange to enter the Law School after three years. The College of Human Ecology offers a program in which students spend their fourth year at the Law School. In addition, members of the Cornell Law School faculty often offer undergraduate courses such as Nature, Functions, and Limits of Law, which are open to all undergraduates.

PREMEDICAL STUDY

Medical and dental schools, while not requiring or recommending any particular major course of study, do require that a particular selection of undergraduate courses be completed. These courses usually include general chemistry and organic chemistry, biology, physics, and a year of English composition (or a freshman writing seminar). In addition, many medical schools require or recommend at least one advanced biological science course, such as genetics, embryology, histology, or physiology.

There is no major program that is the best for those considering medical or dental school, and students are therefore encouraged to pursue their own intellectual interests. Students are more likely to succeed at, and benefit from, subjects that interest and stimulate them, and there is no evidence that medical colleges give special consideration to any particular undergraduate training beyond completion of the required courses. In the past, successful Cornell applicants to medical and dental schools have come from the Colleges of Arts and Sciences, Agriculture and Life Sciences, Human Ecology, and Engineering. The appropriate choice depends to a great extent on the student's other interests.

Qualified students in the Colleges of Agriculture and Life Sciences, Arts and Sciences, and Human Ecology may apply for acceptance into a double registration program arranged between Cornell University and Cornell University Medical College in New York City. This program allows registered students to save one year in pursuit of the bachelor's and M.D. degrees. Further information about this program is available from the Health Careers Program office at the Career Center, Cornell University, 203 Barnes Hall, Ithaca, New York, 14853-1601.

PREVETERINARY STUDY

There is no specific preveterinary program at Cornell, and students interested in veterinary medicine as a career should select a major area for study that fits their interests while at the same time meeting the entrance requirements for veterinary college as listed below. Most preveterinary students at Cornell are enrolled in the College of Agriculture and Life Sciences, which offers several applied science majors, including animal science, that can lead to related careers if the student is not accepted into veterinary college. Some enter other divisions of the university, especially the College of Arts and Sciences, because of secondary interests or the desire for a broad liberal arts curriculum.

The college-level prerequisite courses for admission to the College of Veterinary Medicine at Cornell are English composition, biology or zoology, physics, inorganic chemistry, organic chemistry, biochemistry, and microbiology. All science courses must include a laboratory. These requirements, necessary for admission to the College of Veterinary Medicine at Cornell, may vary at other veterinary colleges.

For information on additional preparation, including work experience and necessary examinations, students should consult the brochure, *Admission to the College of Veterinary Medicine at Cornell*, obtained by writing to the Office of Student Services, College of Veterinary Medicine, Cornell University, C–106 Schurman Hall, Ithaca, New York 14853-6401. Information on the Guaranteed Admissions Program is available from the same address.

Qualified students in the College of Agriculture and Life Sciences may apply for acceptance in a double-registration program arranged between Cornell University and the College of Veterinary Medicine at Cornell. This program allows registered students to save one year in pursuit of the bachelor's and D.V.M. degrees. Further information about this program is available from the Health Careers Program office at the Career Center, Cornell University, 203 Barnes Hall, Ithaca, New York 14853-1601.

NEW YORK STATE COLLEGE OF AGRICULTURE AND LIFE SCIENCES

ADMINISTRATION

David L. Call, dean

Kenneth E. Wing, associate dean

William G. Boldt, assistant dean for public affairs

George J. Conneman, director of academic programs

Elizabeth A. Oltenacu, associate director of academic programs

Brian F. Chabot, director of research

associate director of research

Lucinda A. Noble, director of cooperative extension

R. David Smith, associate director of cooperative extension

Norman T. Uphoff, director of international agriculture

Larry W. Zuidema, associate director of international agriculture

Office of Academic Programs Staff

Student services: Donald Burgett, Lisa Ryan, Catherine Thompson

Records: Tom Wakula

Registrar: Mary Milks

Admissions: Richard Church, Carrie Harlow, Randy Stewart

Career development: William Alberta, Amy Benedict-Martin

Department Chairs

Agricultural and biological engineering: R. B. Furry, Riley-Robb Hall

Agricultural economics: W. G. Tomek, Warren Hall

Animal science: H. F. Hintz, Morrison Hall

Communication: R. D. Colle, Kennedy Hall

Education: R. E. Ripple, Kennedy Hall

Entomology: Q. D. Wheeler, Comstock Hall

Floriculture and ornamental horticulture: G. L. Good, Plant Science Building

Food science: R. A. Ledford, Stocking Hall

Fruit and vegetable science: E. E. Ewing, Plant Science Building

Natural resources: J. P. Lassoie, Fernow Hall

Plant breeding and biometry: W. R. Coffman, Emerson Hall

Plant pathology: W. E. Fry, Plant Science Building

Rural sociology: D. L. Brown, Warren Hall

Soil, crop and atmospheric sciences: R. J. Wagenet, Emerson Hall

Facilities

The College of Agriculture and Life Sciences is located on the upper campus, up the hill from the central area of Cornell University, on land that was once part of the Ezra Cornell family farm.

Buildings around the area commonly known as the Ag Quad house classrooms, offices, and laboratories. Flanking them are the greenhouses, gardens, and research facilities. Nearby orchards, barns, field plots, forests, and streams extend as far as the Animal Science Teaching Research Center at Harford and the Agricultural Experiment Station at Geneva.

Roberts Hall serves as headquarters for the administrative units, including offices of the deans and directors of academic programs, research, and cooperative extension. Included in the Office of Academic Programs are the director and associate director, the Admissions Office, the Career Development Office, the Office of Student Services and the Registrar.

Mann Library, with its extensive collections of materials in the agricultural and biological sciences, is at the east end of the Ag Quad. The student lounge and service center, known as the Alfalfa Room, and many of the college classrooms are in Warren Hall. Public computer facilities are available in Warren Hall, in Riley-Robb Hall, and in Mann Library.

DEGREE PROGRAMS

The College of Agriculture and Life Sciences offers programs leading to the degrees of Bachelor of Science, Master of Science, and Doctor of Philosophy. Professional degrees include the Master of Professional Studies and the Master of Arts in Teaching. Some registered professional licensing and certification programs are also available.

Each curriculum in the college creditable toward a degree is registered with the New York State Education Board and is linked with the national Higher Education General Information Survey (HEGIS) codes for federal and state reporting.

Graduate Degrees

Graduate study is organized by fields that generally coincide with the academic departments but may draw faculty from several disciplines in the various colleges of the university. The following graduate fields have primary affiliation in Agriculture and Life Sciences. Current graduate field representatives are also listed.

Agriculture [M. P.S. (Agr.)], G. Conneman, Roberts Hall

Agricultural and Biological Engineering, M. Walter, Riley-Robb Hall

Agricultural Economics, L. Tauer, Warren Hall

Animal Breeding, J. Pollak, Morrison Hall

Animal Science, R. Quaas, Morrison Hall

*Biochemistry, Molecular and Cell Biology; J. Calvo, Biotechnology Building

Biometry, S. Searle, Warren Hall

*Botany, R. Turgeon, Plant Science Building

Communication [M.P.S. (COMM)], C. Glynn, Kennedy Hall

Development Sociology, T. Lyson, Warren Hall

*Ecology and Evolutionary Biology, N. Hairston, Jr., Corson Hall

Education [also M.A.T.], E. Haller, Kennedy Hall

Entomology, B. Peckarsky, Comstock Hall

Environmental Toxicology, R. Schwartz, Martha Van Rensselaer Hall

Floriculture and Ornamental Horticulture, K. Mudge, Plant Science Building

Food Science and Technology, D. Miller, Stocking Hall

*Genetics and Development, M. Wolfner, Biotechnology Building

International Agriculture and Rural Development [M.P.S. (Agr.)], D. Thurston, Plant Science Building

International Development, N. Uphoff, Caldwell Hall

Landscape Architecture [M.L.A.], L. Mirin, W. Sibley Hall

*Microbiology, S. Zinder, Stocking Hall

Natural Resources, R. Oglesby, Fernow Hall

*Neurobiology and Behavior, R. Harris-Warrick, Seeley Mudd Hall

Nutritional Sciences, B. Lewis, Martha Van Rensselaer Hall

*Physiology, J. Wootton, Vet Research Tower

Plant Breeding, E. Earle, Bradfield Hall

Plant Pathology, J. Lorbeer, Plant Science Building

Plant Protection [M.P.S. (Agr.)], G. Bergstrom, Plant Science Building

Pomology, L. Powell, Plant Science Building

Soil, Crop and Atmospheric Sciences, J. Peverly, Bradfield Hall

Statistics, G. Casella, Warren Hall

Vegetable Crops, P. Ludford, Plant Science Building

*Zoology, D. Noden, Veterinary Research Tower

*Division of Biological Sciences

Bachelor of Science Degree

Departments in the College of Agriculture and Life Sciences sponsor study for the B.S. degree in sixteen major fields. To qualify for the degree, students must fulfill requirements established by the faculty of the college and administered through the Office of Academic Programs. The following units offer major fields of study for undergraduates. A faculty advising coordinator is listed for each unit. Students should consult with the faculty coordinator regarding requirements and

opportunities for concentrations within the major field.

Agricultural and Biological Engineering: L. Albright, 206 Riley-Robb Hall

Animal Sciences: E. J. Pollak, B-22 Morrison Hall

Applied Economics and Business Management: O. Forker, 254 Warren Hall

Biological Sciences, Division of: H. Stinson, 200 Stimson Hall

Communication: B. Earle, 332 Kennedy Hall

Education: D. Hedlund, 403 Kennedy Hall

Entomology: R. Roush, 6130 Comstock Hall

Food Science: J. Sherbon, 207 Stocking Hall

Landscape Architecture: P. Trowbridge, 442 Kennedy Hall

Natural Resources: T. Fahey, 8F Fernow Hall

Plant Science Units (Plant Biology, Breeding, Pathology/Protection, Floriculture, Pomology, Vegetable Crops): D. Viands, 523 Bradfield Hall

Rural Sociology: D. Brown, 133 Warren Hall

Soil, Crop and Atmospheric Sciences: G. Fick, 505 Bradfield Hall

Statistics and Biometry: S. Schwager, 339 Warren Hall

Special Agricultural Studies (ALS): D. Burgett, 140 Roberts Hall

Summary of Basic College Requirements for Graduation

1. Credit Hours

a. Minimum: 120

b. Minimum with letter grade: 100 (number with S-U grades pro-rated for transfer students)

c. Maximum independent study, teaching experience, internships: 15 (pro-rated for transfer students)

d. Minimum College of Agriculture and Life Sciences: 55

e. Maximum from endowed colleges without additional charge: 55

f. Maximum transferred in: 60; minimum at Cornell: 60

Transer credit will *not* be accepted for the Project Advance Programs. If a student is enrolled in a college/university course, during his/her high school years, transfer credit will be given *only* if certain criteria are met, i.e., taught by a university/college instructor, in the college/university environment, along with other college/university students and graded as the college/university students are graded. If one of these is not met no transfer credit will be given. Written verification may be necessary.

Note: Credits received for physical education and for certain other courses, such as Mathematics 109, Education 005 and LSC courses, do not count toward the 120 hours but are included on the transcript and in the grade-point average.

2. Residence

a. Normally, eight full-time semesters

b. Seven semesters, if all other degree requirements are met, with a grade-point average of 2.0

c. Minimum of 12 credits per semester

d. Minimum of two semesters, including the final semester prior to graduation, in the College of Agriculture and Life Sciences (residency in the Internal Transfer Division [ITD] does not count toward residency in the college)

e. Students who have completed 8 semesters in residence at Cornell, including two in the college, and who have 8 or fewer credits remaining for graduation may petition for approval to complete this work elsewhere.

3. Physical Education

a. Completion of university requirement for two terms of work

b. Transfer students may be exempt from part or all of the requirement.

Note: Requests for exemption should be made in writing to the University Faculty Committee on Physical Education. Requests for postponement should be referred to Alan Gantert, Teagle Hall (255-4286). Medical postponement requests must go through Gannett Clinic.

4. Grade-Point Average (GPA)

a. Cumulative GPA: 1.7 or above must be maintained

b. Final GPA: 1.7 on a minimum of 12 credits in final term before graduation.

Note: Only grades earned at Cornell and while registered in the college are included.

5. Distribution

The purpose of the distribution requirement is to acquaint students with a broad range of subject matter. Through study of the physical sciences, students develop quantitative and analytic skills based on an understanding of the physical laws governing the universe; through study of the biological sciences, they gain an appreciation of the variability of living organisms. The social sciences and humanities give students perspective on the structure and values of the society in which we live. Through development of written and oral expression skills, students master the essentials of effective communication.

Credits received for independent study, field, teaching, or work experience, and internships cannot be used to fulfill the distribution requirement. Courses judged to be remedial in the discipline such as Education 005, will not be counted.

Group A: Physical Sciences. 9 credits of 100- or 200- level courses, in at least two disciplines, including at least one course in chemistry or physics.

Soil, Crop and Atmospheric Sciences 131
Astronomy
Chemistry
Geology
Mathematics (excluding Education 005 and Mathematics 109)
Education 115
Physics

*The college mathematics requirement is described below.

Group B: Biological Sciences. 9 credits, including 6 of introductory biological science.

Biological Sciences (except 152, 202, 205, 206, 208, 209, 301)
Animal Sciences 221, 300, 301
Entomology 212
Plant Breeding 225
Plant Pathology 301, 309

Group C: Social Sciences and Humanities. 12 credits (6 in each of the following two categories):

Social Sciences. 100- through 400-level courses in the following departments (excluding Freshman Seminars):

Archaeology
Anthropology
Economics
Government (including Africana Studies 190)
Psychology
Sociology (including Rural Sociology except RS 100, 175, 318, 442)
CEH 110/CEH 111 (cannot receive credit for these courses and Econ 101/Econ 102)
Education 271, 311, 317, 378
HDFS 150 (cannot receive credit for this course and Soc 243)

Humanities. 100- through 400-level courses in the following departments (excluding Freshman Seminars and language courses):

Africana Studies (humanities and history)
Asian and Near Eastern Studies (history and literature)
Classics
Comparative Literature
English (literature only)
French, German, Italian, Russian, and Spanish (literature only)
History
History of Art/Architecture
Music and Theatre Arts (theory, literature, and history only)
Philosophy (also Natural Resources 407)
Religious Studies
Rural Sociology 100, 175, 318, 442

Group D: Written and Oral Expression. 9 credits, of which at least 6 must be in written expression, selected from the following:

Freshman Seminars
Communication 201, 350, 352, 360, 363, 365
English 280–281, 288–289, 382–385, 388–389
Hotel Administration 365

6. Mathematics

The faculty requires minimum competency in mathematics as a requisite to satisfactory pursuit of a degree. All students must complete, with a passing grade, one course in mathematics at Cornell as part of the physical sciences requirement. Advanced placement credit in mathematics or transfer credit in a college calculus course may be presented to meet this requirement.

a. The ALS Mathematics Placement test: All entering undergraduates, including those presenting advanced placement or transfer credit in college calculus, must take the test, which is administered free of charge just prior to registration each semester. Students with accepted advance placement or transfer credit in college calculus will not need to complete a mathematics course at Cornell, unless required by the major. No student may repeat the placement test. It consists of fifty sample questions from arithmetic, algebra, geometry, trigonometry, and basic calculus. The index score is determined by the number of correct answers minus one quarter of the number of incorrect answers.

b. The index score is used to help students select appropriate courses. If a high index score (currently defined as equal to or greater than 30) is attained, the mathematics requirement in physical sciences is waived. If a low index score (of 12 or less) is attained, the student is to enroll in Education 005 before selecting a mathematics course to fulfill the requirement.

c. When presenting mathematics transfer credit (other than calculus), a student may

- include precalculus credits along with the calculus credits
- transfer up to 6 credits to the physical sciences requirement, if the index score is 30 or above
- not transfer that credit to the physical sciences requirement if the index score is from 13 to 29 (credit is, however, counted toward graduation)
- not transfer any credit in mathematics if the index score is below 13.

7. Faculty Adviser

a. Each student is assigned to a faculty adviser soon after being admitted to the college. The faculty adviser will help the student plan a program of study and enroll in courses appropriate to the degree programs offered by the college.

b. Course enrollment each semester should be planned in consultation with the faculty adviser. The signature of the faculty adviser indicates approval of, or at least consent to, the choice of courses made and is required before the course enrollment can be processed.

c. All academic plans, such as acceleration and graduate study, should be made in consultation with the student's faculty adviser. Support of the adviser is essential if a student petitions for an exception to any of the requirements of the college.

8. Progress toward the Degree

a. The progress of each student toward meeting the degree requirements is recorded each term in the college registrar's office on a summary of record form.

b. Students who have been in residence for eight semesters and who have met the graduation requirements will be graduated. Students are entitled to attend for the full eight semesters even if they have completed the graduation requirements in fewer semesters, but must notify the College Registrar of their intent prior to the graduation date. A student who wishes to continue study after graduation must apply for admission as a special student.

c. Graduation with distinction: Students who rank in the top 10 percent of the college's graduates on the basis of the GPA for the last 60 credits completed at Cornell will be graduated with distinction.

STUDENTS

Undergraduate enrollment is approximately 3,000, with about 56 percent in the upper division. Each year about 850 students are graduated, while 650 freshmen and 250 transfer students are enrolled. Members of the faculty of the college serve as chairs of the Special Committees of about 1,000 graduate students.

Admission

The College Admissions Committee selects applicants who are academically well prepared and appear most likely to profit from the college's various curricula.

Most students come from New York State, but around 25 percent come from other parts of the United States or abroad. About half of the undergraduates are women. Approximately 14 percent are identified as members of minority ethnic groups.

Transfer Students

Approximately 18 to 20 percent of the ALS undergraduate students are transfers who have taken part of their collegiate work at community colleges, agricultural and technical colleges, or other four-year institutions. Many of them hold an associate degree.

A Cornell student in good standing may apply for intra-university transfer to pursue a course of study unavailable in his or her current college. Guidelines are available in the Admissions Office of the College of Agriculture and Life Sciences, 177 Roberts Hall. The procedure includes filing a transfer request and submitting a letter explaining reasons for making the transfer.

Consideration is given to students who have demonstrated an interest in their intended field of study, by taking appropriate prerequisite courses and courses within this area of study. Academic achievement is also considered. Students are seldom allowed to transfer during their freshman year.

In some cases a student may be referred to the Internal Transfer Division to study for one semester before entering the college. A second semester is considered under unusual circumstances. During this trial semester the student must achieve a predetermined average (usually 2.7) and take approved courses to assure acceptance.

Special Students

A limited number of non-degree candidates who want to take selected courses in the college are admitted each year. Applicants should submit the standard Cornell application, a resume of their work experience and a list of the courses they want to take. For more information, students should contact the Admissions Office, 177 Roberts Hall.

Part-time Students

All students in the College of Agriculture and Life Sciences are expected to be enrolled as full-time students in a registered program of study. Part-time students must register in the Division of Summer Session, Extramural Courses, and Related Programs. The Continuing Education Information Service, B-12 Ives Hall, provides information, counseling, and special programs for mature students throughout the university.

Off-Campus Students

Programs in which students study off campus but enroll for Cornell credit include SEA semester, field study in human ecology or industrial and labor relations, Albany programs, Cornell-in-Washington, student teaching, IPM internship, and clinical microbiology internship. Students intending to receive Cornell credit for work done off campus should inform the college registrar at the time of enrolling for courses to ensure that proper registration will occur.

Off-Campus Courses

Students in CALS are to be registered for at least twelve (12) hours of course work each semester. It is expected that students will not be enrolled in course work at another institution while they are enrolled at CALS.

One exception would be the joint enrollment agreement between Cornell and Ithaca College. Other exceptions would be reviewed by the Committee on Academic Achievement and Petitions. Students must petition *before* enrolling for a course elsewhere. The committee would approve such petitions only when there are compelling circumstances such as severe scheduling problems or no equivalent course available at Cornell. Enrolling in a course at another college to avoid taking it at Cornell is discouraged.

Leave of Absence

A student considering taking a leave of absence from the university should contact the Office of Student Services. A petition must be filed when requesting a leave of a semester or more. Students returning from a leave of absence do not need to reapply for admission; they should contact Student Services.

Withdrawal

A student who finds it necessary to leave the university permanently should file a petition for withdrawal. Such petitions are approved if the student is in good standing. Students who have withdrawn and who later decide to return must apply to the Admissions Office.

Graduation

Diplomas are prepared by the Office of the University Registrar and distributed to those who have completed the degree requirements and have been approved by the college faculty.

ADVISING AND COUNSELING SERVICES

Faculty members in the College of Agriculture and Life Sciences recognize that students need information and advice to make intelligent decisions while they are in college. They believe that personal contact on a one-to-one basis is an important way to identify individual differences and needs of students. Faculty members believe that they can and should be an important source of information and advice on both academic and personal matters. Thus they consider advising to be an important and integral part of the undergraduate program.

The Office of Student Services has overall responsibility for coordinating the college advising and academic counseling program.

Each student enrolled in the college is assigned to a faculty adviser in the major field of study for aid in developing a program of study and peer advisers are available to help with problems of a general nature relating to personal matters and campus life.

Student Services provides a variety of services for undergraduates in the College of Agriculture and Life Sciences. The staff is available to help students with academic, social, and personal concerns. In addition, learning skills information and tutoring is offered, at no charge, by the college's honor society, Ho-Nun-De-Kah. Assistance is also available for students considering submitting petitions for waiver of college regulations.

The office is located on the first floor of Roberts Hall (room 140). Appointments are not necessary and questions regarding services and procedures should be directed to Donald Burgett and the Student Services staff.

Minority students in the College of Agriculture and Life Sciences receive counseling, tutoring, advising, and referral to agencies that will meet their special needs. The Educational Opportunity Program (EOP) is a state-supported program intended to assist New York State students who meet specific economic and academic criteria set by the State Programs Office and the NYS Board of Regents. Eligible students are accepted during the admissions process.

For further information, please contact Catherine Thompson in 140 Roberts Hall.

The Office of Career Development offers a variety of services to all students and alumni of the college. Career development includes self-awareness and assessment, career exploration, decision making, and job search. Services are designed to assist students and alumni with those activities and to help them develop the career planning and job search skills they will find useful as their career paths progress and change.

An active on-campus recruitment program is integrated with the other services provided by the office. Extensive job vacancy files are updated daily and a bulletin of select job listings is published each month. The Career Library contains an extensive collection of current and useful material. The Sigi Plus system is a computer-assisted guidance system that can help in career and educational planning, providing useful information and ideas about work-related interests, skills and values, and occupations and careers. Internships, summer jobs, job search presentations, and assistance with resume writing are other activities of interest.

The office, in conjunction with a network of college faculty members, assists students throughout their undergraduate years. For further information students should contact William Alberta and the staff in 177 Roberts Hall.

Financial aid is administered through the university office in Day Hall. Endowment funds and annual donations provide supplemental aid for students in the college who are eligible for aid. Information about these college grants is available from the Office of Academic Programs in Roberts Hall, after students have a financial aid package established through the university office in Day Hall. Grants recommended by the college Financial Aid and Scholarship Committee are processed through the university's Office of Financial Aid.

A small loan fund is administered by the college through the Office of Academic Programs to assist students facing short-term emergencies. The loans are interest-free and are usually made for no more than ninety days. For information and an application form students should contact the Office of Academic Programs, Roberts Hall.

Academic Integrity Policy

The College of Agriculture and Life Sciences faculty, students, and administration support and abide by the university Code of Academic Integrity. Its principle is that absolute integrity is expected of every student in all academic undertakings: students must in no way misrepresent their work, fraudulently or unfairly advance their academic status, or be a party to another student's failure to maintain academic integrity.

The maintenance of an atmosphere of academic honor and the fulfillment of the provisions of the code are the responsibility of the students and the faculty. Therefore, all students and faculty members shall refrain from any action that would violate the basic principles of this code.

1) Students assume responsibility for the content and integrity of the work they submit, such as papers, examinations, or reports.

2) Students are guilty of violating the code if they
   - knowingly represent the work of others as their own
   - use or obtain unauthorized assistance in any academic work
   - give fraudulent assistance to another student
   - fabricate data in support of laboratory or field work
   - forge a signature to certify completion or approval
   - knowingly deprive other students of library resources, laboratory equipment, computer programs, and similar aids
   - in any other manner violate the principle of absolute integrity

3) Faculty members assume responsibility to make clear to students and teaching assistants specific regulations that apply to scholarly work in a discipline.

4) Faculty members fulfill their responsibility to
   - maintain in all class, laboratory, and examination activities an atmosphere conducive to academic integrity and honor
   - make clear the conditions under which examinations are to be given
   - make clear the consequences of violating any aspects of the code
   - provide opportunities for students to discuss the content of courses with each other and help each other to master that content and distinguish those activities from course assignments that are meant to test what students can do on their own without help from others
   - state explicitly the procedures for use of materials taken from published sources and the methods appropriate to a discipline by which students must cite the source of such materials
   - approve in advance, in consultation with other faculty members, which work submitted by a student and used by a faculty member to determine a grade in a course may be submitted by that student in a different course
   - monitor the work and maintain such records as will support the crucial underpinning of all guidelines: the students' submitted work must be their own and no one else's

Cornell's Code of Academic Integrity spells out how individuals who have allegedly violated Cornell standards for academic integrity are to be confronted and, if found to be in violation of those standards, sanctioned. The code provides for informal resolution of most perceived violations through a primary hearing between the faculty member and the student involved. If necessary, a hearing before a hearing board follows.

The Academic Integrity Hearing Board for the College of Agriculture and Life Sciences consists of three elected faculty members, three elected student members, a chair appointed by the dean, and the coordinator of student services, who serves as a nonvoting record keeper. Professor D. Grossman is the current chair.

Individuals who observe or are aware of an alleged violation of the code should report the incident to the faculty member in charge of a course or to the chair of the hearing board. General information and details on procedures for suspected violations or hearings are available from the Office of Student Services, 140 Roberts Hall.

ACADEMIC POLICIES AND PROCEDURES

Records

The college registrar maintains for each student a complete record of academic achievement. A permanent record card is on file for each matriculated student and is updated whenever new information becomes available. Staff members are available in Roberts Hall to consult with students regarding the assignment of credit toward meeting distribution and elective requirements and to verify the official summary of record.

The Committee on Academic Achievement and Petitions is a standing committee of six college faculty members and two students. On behalf of the faculty and subject to its review, the committee

- reviews, at the end of each semester and at other times as shall seem appropriate to the committee, the progress of all students not meeting academic requirements
- receives and acts upon petitions from individual students asking for exceptions from particular academic regulations or requirements of the college, or for reconsideration of action previously taken by the committee

- acts upon readmission requests from persons whose previous enrollment was terminated by the committee
- notifies the petitioner in writing of the action taken by the committee

Good academic standing means a student is eligible for, or has been allowed to register and enroll in, academic course work for the current semester. Whether an individual student is in good academic standing is determined by the college registrar and the Committee on Academic Achievement and Petitions.

A petition to be exempt from a college academic requirement or regulation may be filed by any student who has grounds for exemption. Forms are available in the Office of Student Services, 140 Roberts Hall.

A petition is usually prepared with the assistance of a student's faculty adviser, whose signature is required; it indicates the adviser's awareness of the petition. The adviser's recommendation is helpful to the committee. The committee determines whether there is evidence of mitigating and unforeseen circumstances beyond the control of the student that would warrant an exemption or other action.

Registration Procedures

All students must register with the university *and* this college at the beginning of each semester. Registration materials are available at a time and place announced each term by the Office of the College Registrar.

Course Enrollment Procedures

To enroll in courses, students pick up materials from the college Registrar's Office, 140 Roberts Hall; plan a schedule in consultation with their adviser; and return the completed forms to the Registrar's Office for verification and processing. Class lists are generated on the basis of the properly filed course enrollment forms.

To enroll in courses that involve independent study, teaching, or research, a student must file an independent study form, available in the college Registrar's Office, 140 Roberts Hall. Students who will be studying off campus or abroad should file the intent to study off campus form to ensure that proper registration will occur. These forms are available in the Program office (Cornell Abroad, 474 Uris Hall).

Students may enroll again for a course in which they received a grade of F in a previous semester. The grade received the second time will be recorded and both grades calculated as part of their GPA.

Students should *not* enroll again for a course in which they received an incomplete. Instead, work for that course should be completed, and the instructor files an incomplete make-up form to assign the grade. An incomplete not made up by the end of two successive semesters of registration reverts to a failure. In the case of a graduating senior, incompletes revert to failures at the time of graduation.

Students enrolled in a two-semester course will receive an R at the end of the first semester and should enroll again for the same course the second semester. The letter grade will be recorded for the second semester when all work for the course is completed. A note on the transcript will explain the two grades for the same course.

A student is held responsible for and receives a grade for those courses in which he or she enrolls unless the student officially changes such enrollment. All changes in courses or credit, grading options, or sections must be made by the student at the Registrar's Office, 140 Roberts Hall, on an official form provided for that purpose.

Add/Drop/Changes are made by filing properly signed forms in the Registrar's Office, 140 Roberts Hall. Approval and signature of the faculty adviser and course instructor are required to add or to drop a course.

Students may add courses and change grading options or credit hours where applicable during the first three weeks of the term and may drop courses until the end of the seventh week.

Students wishing to withdraw from a course after the end of the seventh week must petition to the college Committee on Academic Achievement and Petitions. A form is available in Student Services, 140 Roberts Hall. Requests for course changes are approved only when the members of the committee are convinced that unusual circumstances are clearly beyond the control of the student. The committee assumes that students should have been able to make decisions about course content, total work load, and scheduling prior to the end of the seventh week of the semester.

If the petition to drop a course is approved after the end of the eighth week of classes, the course remains on the student's record and a W (for "withdrawal") is recorded on the transcript.

Grade Reports

Grade reports for the fall term are included in spring term registration materials; grade reports for the spring term are mailed by the office of the university registrar to students at their home addresses unless alternative addresses are reported to the college or university registrar by mid-May.

Academic Deficiency Policies

At the end of each semester, the Committee on Academic Achievement and Petitions reviews the records of those students who in any respect are failing to meet the academic requirements of the college or who persistently fail to attend classes. In case of students not making satisfactory progress, the committee takes appropriate action, including, but not limited to, issuing warnings to students, placing them on probation, suspending them, decreeing that they may not reregister, granting them leaves of absence, and advising them to withdraw.

Specifically, the committee considers as possible cause for action failure to attend and participate in courses on a regular basis or, at the end of any semester, failure to attain one or more of the following:

- semester GPA of at least 1.7
- cumulative GPA of at least 1.7
- satisfactory completion of 12 or more credits per semester
- reasonable progress toward completion of distribution requirements
- appropriate completion of college and university requirements

In general terms, regular participation in course work with academic loads at a level sufficient to assure graduation within eight semesters and grades averaging C– (1.7) or higher are prima facie evidence of satisfactory progress.

HONORS PROGRAM

The Bachelor of Science degree with honors will be conferred upon those students who, in addition to having completed the requirements for the degree of Bachelor of Science, have satisfactorily completed the honors program in their area of major interest and have been recommended for the degree by the honors committee of that area.

An undergraduate wishing to enroll in the honors program must have completed at least 55 credits, at least 30 of the 55 at Cornell. Also, the student must have attained a cumulative grade-point average of at least 3.0 at the time of entry.

Interested students must make written application no later than the end of the third week of the first semester of their senior year, but are encouraged to make arrangements with a faculty member during the second semester of their junior year. An application form is available from the college registrar, 140 Roberts Hall, or from the area committee chair. (Biological sciences students should get applications at 200 Stimson Hall.)

Written approval of the faculty member who will direct the research and of the honors committee in the area is required. After the college registrar verifies the student's grade-point average, the student will be officially enrolled in the honors program.

Academic credit may also be earned by enrolling in an appropriate independent study course. When applying for admission to the program, the student may, if appropriate, submit a budget and a modest request for funds to cover some of the costs the student incurs in doing the research.

The honors committee for each area recommends to the college registrar those students who qualify for honors. Only those who maintain a GPA of at least 3.0 will be graduated with honors.

Students in the College of Agriculture and Life Sciences wishing to participate in the honors program must be accepted in one of the program areas approved by the faculty. Students are not eligible for honors by participating in a program offered by another college or administrative unit.

Animal Sciences

Faculty committee: R. L. Quaas, chair; D. E. Bauman, R. D. Boyd, P. A. Johnson

The objective of the animal sciences honors program is to provide outstanding undergraduates with the opportunity to pursue supervised independent research and to develop an awareness of the scientific process. It is expected that the research will require significant effort and creative input by the student in its design and execution and in the reporting of the results.

Those students with majors in animal sciences who are interested in doing an honors project should consult with their faculty advisers early in their junior year. All students are expected to meet the college requirements in qualifying for the program and to complete the following:

- Identify a potential honors project sponsor (i.e., a faculty member working in the animal sciences) and secure that faculty member's commitment to sponsor the student in the honors project. That should be accomplished early in the second semester of the junior year.
- Preregister during the spring semester for AS 496, Animal Sciences Honors Seminar, which is offered in the fall semester.
- Register for 3 credit hours of AS 499, Undergraduate Research, for the research project during a semester prior to that in which the honors thesis will be completed. Additional AS 499 credit on other topics may be taken in earlier semesters if the student so desires. AS 499 credit will not be given during the last semester of the student's honors project.
- Participate in AS 402, Seminar in Animal Sciences, during the spring semester and report on and discuss the project and results.
- Submit a written thesis to the honors committee and to a selected external reviewer by the scheduled deadline. Specific information regarding deadlines, format, and organization for the thesis will be provided.
- Meet with the honors committee for a short oral defense of the thesis following a review of the thesis by the student's sponsor, the external reviewer, and the honors committee.

Details pertaining to the specific requirements of the program can be obtained from the office of the committee chair, 114 Morrison Hall.

Biological Sciences

Students interested in the honors program in the biological sciences should consult with their faculty advisers and with potential faculty research sponsors early in their junior year. See "Independent Research and Honors Program" in the Biological Sciences section of this catalog for complete details. Applications and details pertaining to the program requirements may be obtained from the division's Office for Academic Affairs, 200 Stimson Hall. Information on faculty research activities is available in the Behrman Biology Center, 216 Stimson Hall.

Entomology

Faculty committee: W. L. Brown, Jr., chair; D. Pimentel, M. J. Tauber

An honors program in the area of entomology may be pursued by any qualified student in the College of Agriculture and Life Sciences (see the requirements at the beginning of this section). The student need not be specializing in entomology. Insects, because of their variety, small size, and easy availability, are convenient subjects for study in a wide array of problems dealing with living systems. Short life cycles, unique physiologies and developmental patterns, and species with easily managed colony requirements and a wide range of behavioral traits provide the raw material for honors study. Cornell's diverse faculty interests and extensive collections and library in entomology are also major assets if a student selects entomology as the area for honors study.

The honors committee requires that an undergraduate who is interested in embarking upon an honors project proceed with the following steps:

- Discuss the matter with his or her academic adviser, preferably in the junior year, so that a research project can be carefully planned. The possibility of conducting some research during the junior year and/or summer should be discussed.
- Discuss the project with an appropriate faculty member in the Department of Entomology who can serve as a supervisor to oversee the honors research. (The faculty adviser will be of assistance in determining which faculty entomologist might be the best supervisor, the decision being based primarily on available faculty members' areas of expertise.)
- Prepare a brief, tentative plan for the project for discussion and approval of the honors project supervisor. The plan should include a statement of objects or hypotheses, proposed methods for testing hypotheses, needs for laboratory space or shared equipment, and a budget outlining financial support needed for travel and supplies.
- Present a completed application to the chair of the entomology honors committee no later than the end of the third week of the first semester of the senior year. Earlier submission is encouraged.
- Submit a brief progress report, approved by the project supervisor, to the entomology honors committee by midterm of the semester in which the student will complete his or her graduation requirements.
- Present a formal seminar reporting the significant findings of the research to the Department of Entomology (preferably as a Jugatae seminar) in the last semester of the senior year.
- Submit two copies of the final project report (honors thesis) to the chair of the entomology area honors committee no later than two weeks before the last day of classes in the semester in which the student anticipates graduation. The thesis will be reviewed by the faculty honors project supervisor and one other referee from the department honors committee. The committee will return the thesis to the student one week before the last day of classes. If reviewers indicate that changes must be made, the revised thesis should be submitted to the chair no later than the last day of classes.

Natural Resources

Faculty committee: M. E. Richmond, chair; J. W. Kelley, R. J. McNeil

The honors program in natural resources provides an opportunity for undergraduates to participate in independent research in the areas of fisheries and aquatic science, forest science, wildlife science, ecotoxicology, and conservation. The subject matter and nature of the research experience may be quite varied in this program but require the guidance and supervision of a faculty member with substantial interest and expertise in the problem area chosen.

In addition to meeting requirements of the college, the student is expected to do the following:

- Register for the honors program in the junior year or earlier.
- Select a faculty adviser who will help identify and formulate a research problem.
- Carry out an independent research effort that is original and separate from the work of others who may be investigating similar subjects.
- Describe and summarize the work in the format of a conventional master's thesis or in the form of a scientific paper ready for journal submission. About half of the theses have been published.
- Work closely with at least two faculty or staff members who will agree to serve as readers for the thesis. Provide readers with a copy of the guidelines for evaluation of honors theses, available from the department's honors program committee.

Nutritional Sciences

Faculty committee: R. Schwartz, chair; R. Martorell, R. Parker

The honors program in nutritional sciences is designed to provide the academically talented undergraduate with the opportunity to become involved in a faculty research program. This program is available to students majoring in nutrition, food, and agriculture. Students are selected in the spring semester of the sophomore year on the basis of scholastic achievement, cumulative grade point average, and motivation for independent study. Students interested in participating in the honors program should consult their faculty advisers or contact committee chair Professor R. Parker, 113 Savage Hall, and submit their application to the honors committee.

In addition to meeting requirements of the college, to qualify for graduation with honors, students must:

- Maintain high scholastic achievement.
- Satisfactorily complete the junior seminars, NS 398 and 498. Students are required to complete biochemistry by the end of the first semester of the junior year, and strongly encouraged to complete NS 332, Laboratory Methods in Nutritional Sciences, by the end of the junior year.
- Satisfactorily complete NS 499, Honors Problem, with a minimum of 6 credits, during the senior year. To do so they must (1) attend a one-hour senior seminar, fall and spring, (2) plan and carry out an independent research problem in consultation with a faculty adviser, (3) submit for approval a written thesis to the division honors committee, (4) present a final seminar on their research, and (5) register for honors with the ALS college registrar by the first two weeks of the senior year.

A copy of the honors program guidelines are available in the division's Academic Affairs Office, 335 Martha Van Rensselaer Hall, or from the honors chair.

Physical Sciences

Faculty committee: J. W. Sherbon, chair; G. W. Fick, C. E. McCulloch, J.-Y. Parlange

The honors program in physical sciences provides outstanding students with an opportunity to do independent research under the supervision of a faculty member in the Departments of Agricultural and Biological Engineering; Soil, Crop, and Atmospheric Sciences; Food Science; or in the Biometrics Unit.

Students must be enrolled in the program for a minimum of two semesters and must also enroll in the appropriate departmental independent study course for a total of at least 6 credits. They must submit a report of their research to the honors committee at least four weeks prior to the end of instruction of the semester in which they expect to graduate.

Details of the program can be obtained from the chair of the physical sciences honors committee.

Plant Sciences

Faculty committee: R. L. Obendorf, chair; L. L. Creasy, A. M. Petrovic, W. A. Sinclair

Before acceptance into the program, students must submit to the chair of the plant sciences honors committee a completed application and a one-page tentative project proposal by the end of the second week of classes in the first semester of their senior year. The project proposal should include a clear statement of the objective(s) of the research, methodology, and needs for space, equipment, and supplies (attached budget required). The proposal must be accompanied by a letter from the faculty supervisor stating that he or she has seen and approved the project plan. Full committee approval is needed for acceptance into the program.

Completion of the honors program in plant sciences requires two copies of a report of independent research in the honors program to be submitted to the chair of the honors committee before the last day of classes of the semester in which the degree is sought. The report should be written in the format for research publication required by that discipline of plant science in which the student is enrolled. The report must be accompanied by a letter of recommendation from the supervisor of the research, that letter reflecting the supervisor's familiarity with the research and providing an evaluation of the performance and a recommendation for graduation with honors.

The honors committee will review the report, and, if a majority of the committee votes favorably, the chair will recommend graduation with honors for that student in a letter to the director of academic programs. One copy of the report will be returned to the student. The other will be shelved in Mann Library.

Social Sciences

Faculty committee: T. A. Hirschl, chair; J. M. Conrad, E. J. Haller, B. V. Lewenstein

Acceptance into the behavioral and social sciences honors program of the College of Agriculture and Life Sciences is contingent on meeting all the criteria described above, on information in the student's written application, and on a detailed thesis proposal. The application and proposal are due no later than the third week of the first semester of the senior year. Each student is encouraged to begin working on this proposal with a prospective faculty thesis adviser during the first semester of the junior year. The purpose of the proposal is twofold. First, it formalizes a plan of study and establishes a set of expectations between the student and his or her faculty adviser. Second, the Honors Committee reviews the proposal to determine whether it is consistent with honors thesis requirements, and to make suggestions for improvement.

The proposal must be 5–10 typed, double-spaced pages in length and include the following sections:

- **Research Topic:** This section should contain a statement of the problem to be studied or the topic of interest. The relevant literature should be briefly reviewed and the background of the problem or topic discussed; a more extensive bibliography should be included.
- **Research Questions/Empirical Hypotheses:** This section should contain specific questions to be answered or hypotheses to be empirically tested via collection of data and statistical analysis or some other mode of analysis accepted in the social sciences.
- **Research Methods:** This section should contain a dicussion of models to be constructed, data collection procedures (including survey instruments or experiments, if appropriate), and methods of analysis.
- **Expected Significance:** What new knowledge or information is likely to be forthcoming and why is it important?

Faculty advisers must be members of the graduate faculty. Exceptions to this rule will be granted for persons with special expertise who are deemed capable of thesis supervision; exceptions will be granted pending petition to the social science honors committee. Students may register for independent study directed by the faculty adviser in conjunction with an honors project.

Honors degrees are awarded upon approval of the honors thesis by the social science honors committee. The research should deal with a substantive issue within one of the fields in the social sciences. Both the results of the research and the methodology (or the argument by which the results were achieved) must be reported. Reviews of the literature, practical conclusions or applications, or broad characterizations of an area of inquiry may constitute part of the research report but are not themselves sufficient to count as research.

Honors theses should be written according to the form of any standard journal within the appropriate fields. Four copies of the thesis must be submitted to the chair of the social science committee no later than three weeks before the last day of classes of the semester for which the degree is sought. A supporting letter from the faculty member supervising the work also must be submitted. Approval of the thesis requires a majority vote of the honors committee.

INTERCOLLEGE PROGRAMS

The College of Agriculture and Life Sciences does not participate in any dual-degree programs. Study for the Bachelor of Science is the only undergraduate degree program offered.

The College of Veterinary Medicine may accept students who are then permitted to double-register in their seventh or eighth semester and complete requirements for the Bachelor of Science degree in the College of Agriculture and Life Sciences. Students should consult with the college registrar, 140 Roberts Hall, to ensure that degree requirements have been fulfilled.

Students who have been offered admission to the S. C. Johnson Graduate School of Management upon completion of the B.S degree in Agriculture and Life Sciences may take a program of management courses in their senior year if it is approved by their college faculty adviser as part of their undergraduate program. In certain cases an "upset" tuition charge, equal to the endowed undergraduate tuition rate, will be applied for undergraduate statutory college students taking excess credit hours from endowed colleges and schools. Inquiries should be directed to the university bursar.

Students in the Field Program in Agricultural and Biological Engineering are usually enrolled in the College of Agriculture and Life Sciences during the freshman and sophomore years and jointly enrolled in this college and the College of Engineering in the junior and senior years. Students pay the engineering college tuition in the junior year. The curriculum is accredited by the Accreditation Board for Engineering and Technology. The B.S. degree is awarded in cooperation with the College of Engineering.

The Program in Landscape Architecture is cosponsored by the Department of Floriculture and Ornamental Horticulture in the College of Agriculture and Life Sciences and by the College of Architecture, Art, and Planning. The program offers a first professional degree curriculum in landscape architecture at both undergraduate and graduate levels, as well as a graduate second professional degree program.

The Division of Nutritional Sciences is an intercollege unit affiliated with the College of Human Ecology and the College of Agriculture and Life Sciences. The undergraduate nutrition major is based in the College of Human Ecology. Students in Agriculture and Life Sciences may study nutrition in areas such as animal sciences; food-industry management; food science; microbiology; nutrition, food, and agriculture; and fruit or vegetable science. Students may also plan a concentration in biological sciences or a concentration in general studies in agriculture to include a human nutrition component.

The Program on Science, Technology, and Society is an academic unit that engages in teaching and research involving the interactions of science and technology with social and political institutions. The program draws its students, faculty, and research staff from the various divisions of the university, including the College of Agriculture and Life Sciences. It offers an interdisciplinary undergraduate curriculum in Biology and Society. A concentration in general studies in the agriculture major may be planned in

consultation with a faculty adviser to include a biology and society component. Further information, including a list of courses, may be obtained from the program office, 632 Clark Hall.

The American Indian Program (AIP) is a multidisciplinary intercollege program with instructional, research, and extension components. The instructional core consists of courses focusing on American Indian life with emphasis on the Iroquois and other Indians of the Northeast. A description of the program and general information is available from the director of the American Indian Program, Caldwell Hall.

The Comparative and Environmental Toxicology Program is an interdisciplinary intercollege program with research, teaching, and cooperative extension components coordinated by the Institute for Comparative and Environmental Toxicology (ICET). Courses are cosponsored by academic departments in several colleges of the university. A description of the program and general information is available from the director of the program through the ICET office, 16 Fernow Hall.

The Cornell Laboratory of Environmental Applications of Remote Sensing (CLEARS) is an interdisciplinary intercollege center with teaching, research, and extension components affiliated with the College of Agriculture and Life Sciences and the School of Civil and Environmental Engineering. A description of the program and general information is available from the director through the CLEARS office in Hollister Hall.

OFF-CAMPUS STUDY PROGRAMS

Study off campus is of two types: (1) credit may be earned at another institution and transferred to Cornell, or (2) credit may be earned in Cornell courses that require off-campus activity.

An Intent to Study Off Campus form should be filed with the college registrar before leaving campus. Tuition may be reduced. In some cases stipends or cost of living allowances are provided. Students should consult with the Office of Financial Aid if receiving financial aid and clear all accounts with the bursar prior to departure.

Students who plan to enroll in courses at another institution in the United States must petition for a leave of absence. Courses should be selected in consultation with the faculty adviser.

Albany Programs

Study off campus in Albany, the New York State capital, provides a unique opportunity to combine career interests with academic and legislative concerns. Students receive an intensive orientation to state government and attend a lecture-seminar program composed of three two-credit components and offered by professors-in-residence. An internship experience, supervised by an internship committee, provides up to six academic credits. Independent study and research courses offered by the various departments in ALS and/or courses offered by academic institutions in the Albany areas may be elected.

Three opportunities are available. The Assembly Intern Program provides a placement with a member of staff of the New York State Assembly. The Senate Assistants Program has placements with New York State senators and selected staff. The Albany Semester Program provides experience with a state agency such as the Departments of Environmental Conservation, Education, or Labor.

Applicants are screened by the ALS Internship Committee in the term prior to assignments. Those accepted should plan a program of study in consultation with their faculty adviser. At least twelve credits must be carried to meet the residence requirement. Seniors should note that the last term average must be 1.7 or above.

All interns will audit the orientation sessions and meet participation requirements in at least two of the lecture-seminar sections. The paper required in each section constitutes an independent study project to be directed and evaluated by a Cornell faculty member in an appropriate discipline. Normally a faculty member will not sponsor more than one of the independent study courses for any one student. To receive academic credit for the internship, students enroll in ALS 400, for an S-U grade only.

Information and applications are available in the Career Development Office, 177 Roberts Hall.

Cornell-in-Washington

Students in all colleges apply for the Cornell-in-Washington program through the Department of Government, 134 McGraw Hall. ALS students admitted to the program should file the off-campus study form with the college registrar prior to leaving campus. Selection of courses should be made in consultation with an academic faculty adviser to assure that the courses are appropriate for the degree program being pursued. The course enrollment forms should be filed in the office of the college registrar as soon as course selection is completed and approved.

SEA Semester

The Sea Education Association is a nonprofit educational institution offering ocean-focused academic programs and the opportunity to live, work, and study at sea. Science, the humanities, and practical seamanship are integrated in small, personal classes. The 17-credit program is twelve weeks in length. Six weeks are spent in Woods Hole, the following six weeks are spent on either one of SEA's two sailing vessels: the R/V Westward, or the R/V Corwith Cramer. For more information, students should contact the Cornell Marine Programs office, G14 Stimson Hall. ALS students should file the intent to study off campus form with the college registrar as early as possible to ensure proper registration and enrollment in courses.

Shoals Marine Laboratory

The Shoals Marine Laboratory, run cooperatively by Cornell University and the University of New Hampshire, is a seasonal field station located on 95-acre Appledore Island off the coast of Portsmouth, New Hampshire, in the Gulf of Maine. SML offers undergraduate, beginning graduate students, and other interested adults a unique opportunity to study marine science in a setting noted for its biota, geology, and history. Please refer to "Courses in Marine Science," under the section on the Division of Biological Sciences, for a list of courses offered.

For more information, contact the Shoals Marine Laboratory office, G14 Stimson Hall, 607-255-3717.

Internships

Several departments in the college offer supervised internships for academic credit. Arrangements should be made with the offering department for assignment of a faculty member who will be responsible for placement, for planning the program of work, and for evaluation of student performance.

For internships not governed by an established internship course, the student must enroll in a 497 course for the number of credits to be assigned. If the work is done during the summer, the student must enroll in the Cornell summer session for the agreed-upon credits.

In cases where the work is not done at Cornell, the awarding of credits depends upon a prior contractual arrangement between a Cornell professor and the student. Specific terms for receiving credit and a grade should be recorded, using the Independent Study, Research, Teaching, or Internship form, available in the Registrar's Office, Roberts Hall.

A maximum of 15 (pro-rated for transfer students) of the 120 credits required for the degree may be taken in internships, independent study courses, and undergraduate teaching or research. No more than 6 of the 15 credits allowed for independent study may be awarded for internships consisting of off-campus work experiences that do not have the continued presence of a Cornell faculty member. The 6-credit allotment includes transfer credit and credit for internships in other colleges at Cornell. The 6-credit limit does not apply to secondary, postsecondary, and cooperative extension teaching internships in the Department of Education.

The College of Agriculture and Life Sciences does not offer a field study option. In general, a rather narrow view is taken toward awarding academic credit for work experience, "life" experience, or apprenticeships. Credit will only be assigned or accepted in cases where a professor is directly involved in determining both the course content and in evaluating a student's work. The awarding of credit will not be allowed in cases where a student brings to the college or to a professor a description of a past experience and requests credit nor in cases where the student has received financial remuneration.

All students enrolling for an internship must file an independent study, research, teaching, or internship form with the Office of the College Registrar. If the study is to take place off campus, the Intent to Study Off Campus form should also be filed with the college registrar.

Overseas Academic Programs

The Cornell Abroad program is open to students in all colleges of the university. Students in the College of Agriculture and Life Sciences should consult with their faculty adviser and the college registrar to ensure that credit received for academic work abroad will

meet requirements for graduation. The Office of Student Services, 140 Roberts Hall, has information and application forms.

Cooperative arrangements with the University of Reading, in England, and the University of Dublin, in Ireland, enable the college to endorse several students for a year of study under a tutor in those schools. The Swedish exchange program is operated in cooperation with the Agricultural College of Sweden at Uppsala. The ALS student selected to participate in the Swedish exchange spends the junior year at Uppsala. All essential expenses in Sweden, including a living allowance, are provided by a student group there. Round-trip air transportation must be paid by the student. An exchange student from Uppsala spends a year at Cornell, supported by the college and the Cornell student in Sweden. A similar program is operated in cooperation with ITESM in Monterrey, Mexico.

MAJOR FIELDS OF STUDY

The college curriculum emphasizes the biological and physical sciences and the technology basic to the study of agriculture and life sciences. The sixteen major program areas reflect the departmental academic effort in the college. Faculty curriculum committees in each area identify a sequence of courses appropriate to all students studying in that field. Courses of study are designed to provide systematic development of basic skills and concepts. Opportunity for concentration in an area of particular interest is usually available.

Programs are planned with considerable flexibility, allowing students to prepare for careers, graduate work, professional opportunities, and the responsibilities of educated citizens. Course requirements in each program area are different, but all students must meet minimum distribution requirements of the college.

Agricultural and Biological Engineering

Agricultural and biological engineering is a field of engineering application wherein the engineering, biological, environmental, agricultural, and social sciences are applied primarily to problems of producing food, feed, and fiber, while at the same time conserving our natural resources and the quality of our environment. Increasingly important aspects of the field are engineering applications related to biotechnology, the environment, and international engineering. As a field of engineering application, agricultural and biological engineering is rapidly evolving to encompass new uses of electronics and computers, advances in the biological sciences, and engineering analysis applied to systems ranging from microcosms, such as carbon dioxide diffusing into leaf stomatal cavities, to entire ecosystems surrounding rivers and lakes, to growing food in space colonies.

Because agricultural and biological engineers work at the interface between the biological and physical sciences, they must be knowledgeable in each. They are educated in mathematics, physics, chemistry, and the engineering sciences; and in biology and the agricultural and social sciences. It is the mix of engineering and biology that makes Agricultural and Biological Engineering unique.

The undergraduate program area offered by the Department of Agricultural and Biological Engineering includes three distinct academic programs: Agricultural and Biological Engineering, Environmental Systems Technology, and Agricultural Systems Technology. The department is located in Riley-Robb Hall and operates specialized facilities that are among the largest and most complete of their kind in the world.

The Agricultural and Biological Engineering program has four concentrations—Agricultural Engineering, Biological Engineering, Environmental Systems, and Food Engineering—and is intended for students who are particularly interested in the theoretical and fundamental aspects of engineering required for design and research. Students in this program must be highly motivated and have strong aptitudes for mathematics and the sciences. Biological, social, and agricultural sciences are integrated into this program, but mathematics and the physical sciences dominate. The program is accredited by the Accreditation Board for Engineering and Technology and is jointly sponsored by the New York State College of Agriculture and Life Sciences and the College of Engineering. Students register in both colleges during their junior and senior years, with the primary college being the College of Engineering during the junior year, then the College of Agriculture and Life Sciences during the senior year. Because the Agricultural and Biological Engineering program is a nationally accredited engineering program, it is more structured than the two technology programs.

The Agricultural and Biological Engineering program provides excellent preparation for a variety of positions in industry and public agencies, and qualified graduates often continue study in a Master of Engineering, Master of Science, or doctoral degree program; or in veterinary science or medicine. For specific course requirements and other information for the Agricultural and Biological Engineering program, see the section on the College of Engineering in this same publication.

The two technology programs emphasize applied and technical aspects of agricultural, biological, and environmental sciences. These programs incorporate courses in basic biological and physical sciences and mathematics as well as engineering and technology, agriculture, business, social sciences, and liberal studies. The student develops his or her own program of advanced and elective courses in consultation with a faculty adviser, and may have an informal minor in an area such as communication, business, education, or international agriculture.

Specific course distribution requirements for the academic programs in technology include:

		Credits
A.	*Basic Subjects*	
1.	Calculus	8
2.	Chemistry	6
3.	Physics	8
4.	Introductory biological science	6
5.	Computer applications	4
6.	Statistics or probability	3
7.	Economics	3
8.	Oral communication	3
B.	*Advanced and Applied Subjects*	
1.	Five courses in the agricultural, biological, or environmental sciences	15
2.	Five engineering courses at the 300 level or above; at least 9 credits in agricultural and biological engineering	15
C.	*Electives*	
	Additional courses to complete college requirements	
D.	*Total (minimum)*	*120*

For further details on the Agricultural and Biological Engineering and technology programs, see the department's undergraduate programs publication, available at 206 Riley-Robb Hall, or telephone the Coordinator of Instruction for the programs, at 255-2483.

Animal Sciences

The animal sciences program area offers a coordinated group of courses dealing with the principles of animal breeding, nutrition, physiology, management, and meat science. While emphasis in subject matter is directed toward farm-animal species, including dairy and beef cattle, horses, poultry, pigs, and sheep, laboratory and other species are used in research and teaching programs as well. The departments have extensive facilities for raising animals and well-equipped laboratories and classrooms, including a teaching barn, in which students can gain practical experience in the care and management of large animals at a convenient location on campus.

The program focuses on the application of science to the efficient production of animals for food, fiber, and pleasure and easily accommodates a variety of interests and goals. Beyond a core of basic courses (suggested minimum, 12 credits) students select production and advanced courses to fulfill an individually tailored program worked out in consultation with their advisers. In this way it is possible to concentrate by species as well as by subject matter (nutrition, physiology, growth biology, breeding, management). For each subject area, supporting courses in other departments are readily available and strongly encouraged. Many science-oriented students elect a program emphasizing supportive preparation in the physical and biological sciences appropriate to graduate or professional study following graduation. Dairy management, for example, is a popular program among students who may be preparing to manage a dairy farm or enter a related career. Other students may elect a program oriented toward economics and business in preparation for a career in the poultry, dairy, meat-animal, horse, feed, or meats industry. These are examples of the flexibility of programs that can be developed to meet a student's career interest related to animals.

It is highly recommended that students obtain appropriate fieldwork experience during summers. Several special training opportunities exist for highly motivated students. Upperclass students whose academic records warrant it may, by arrangement with individual faculty members, engage in research (either for credit or for honors) or assist with teaching (for credit). The Dairy Management Fellows program and the

Livestock Fellows program offer an equally challenging but different type of experience for a highly select group of students.

Applied Economics and Business Management

The undergraduate program in applied economics and business management is based in the Department of Agricultural Economics. Courses in agricultural economics are supplemented with others in related areas such as computer science, economics, sociology, history, government, industrial and labor relations, hotel administration, consumer economics, animal sciences, plant sciences, natural resources, mathematics, and statistics.

Five areas of specialization are offered:

Agribusiness management is designed for students who have a special interest in the economics and management of businesses that provide services for the agricultural sector of the economy.

Agricultural and applied economics provides a general program in the economics of the agricultural sector and of resource use. It is an appropriate major for those students who (1) are interested in applied economics; (2) want to survey offerings in agricultural economics, such as management, marketing, economic development, policy, and environmental and resource economics; and (3) want to prepare for graduate work in agricultural economics. It is an appropriate option for those interested in the application of the principles of economics to problems in both the public and private sector.

Business management and marketing applies the principles of economics and the tools of management to prepare students for careers in business. Special emphasis is given to developing decision-making skills and to the study of the structure and practices of business institutions. Market analysis, sales, banking, merchandising, production management, and general business management are careers for which students may prepare.

Environmental and resource economics provides training for students interested in applying economic concepts to problems of the environment and resource use. A good option for those wishing to take positions as analysts with agencies that have environmental responsibility or facing environmental regulations. Also provides a strong foundation for graduate work.

Farm business management and finance is intended for students with farm experience who are interested in farming or in preparing for work in farm management or farm finance, in cooperative extension, or in farm cooperatives.

Food-industry management is designed for students interested in management or sales positions with the processing, manufacturing, or distribution segments of the food industry.

In planning a course schedule, students must work closely with their faculty adviser. Each area of specialization has its own unique set of required and recommended courses, yet all the areas have enough flexibility to satisfy the interests and abilities of each individual student.

Biological Sciences

The program of study in biology is offered by the Division of Biological Sciences. Students enroll in either the College of Agriculture and Life Sciences or the College of Arts and Sciences.

Programs of study within the biology major include general biology; animal physiology and anatomy; biochemistry; botany; cell biology; ecology, systematics, and evolution; genetics and development; microbiology; neurobiology and behavior; and an independent study option. Programs of study are described under the Division of Biological Sciences.

Communication

Everyone relates to others through the process of communication. Whether these human linkages are personal or through the mass media, there is an increasing need for individuals who can help establish communication relationships and make them more efficient and effective. Individuals who are able to do this must have good communication skills themselves and must comprehend the social psychology of human communication. Students in the Department of Communication have the opportunity to learn both the social science underlying human communication and the most effective means of adapting written, interpersonal, audio, and visual communication to audiences. The curriculum emphasizes learning communication theory along with communication skills. With this preparation, students will be ready to meet the needs of communicating in the twenty-first century.

Required courses for majors include courses in the theory of communication, introduction to mass media, public speaking, visual communication, research methods in communication, and an upper level professional writing course. Beyond these requirements students choose 18 credit hours of course work within the Department of Communication. Specific choices of courses are determined by a student's interests and guided by faculty advice.

The major prepares students for careers as communication, information, and public relations specialists in a wide variety of organizations, and for careers in information agencies in which they must work with a wide range of publics and media. Students can prepare for work in publication where they might be editors or writers in virtually any organization, perhaps preparing annual reports, editing an employee newspaper, writing sales or marketing literature, or writing news stories. Other careers open to communication majors are in human service professions, such as personnel administration, training, or sales and consulting; the major also prepares students for graduate study in communication and other social sciences.

The superior resources of Cornell's natural and social science courses may be combined with communication principles and skills to offer students the background needed for presenting scientific and technical information to the general public or communicating with scientific and technical constituencies.

In addition to the course requirements for a sequence, a concentration of at least 12 credits outside the department is required. The concentration helps orient students to a communication career in either a business, government, education, or public service organization or to a very specific profession such as agribusiness public relations or science communication. Those interested in international communication or environmental communication may combine courses outside the department to provide a solid background for communciation careers in these areas.

Students are strongly encouraged to seek practical communication experience through part-time or summer employment, the department's internship course, or the campus media. Work experience contributes to a portfolio of professional materials that is invaluable in obtaining a position in communication.

Further information is available from the Department of Communication, Kennedy Hall.

Education

The focus in the Department of Education is on how teaching and learning take place in school and nonschool settings, as well as on the role of education in our society. Students study concepts and develop competencies necessary to analyze educational situations critically and to plan, implement, and evaluate educational programs. Students in the program area take a core curriculum:

- A course in general psychology (e.g., Psychology 101)
- A course in educational psychology (e.g., Education 311, 317)
- A course in the social and philosophical foundations of education (e.g., Education 271, 370, 378, 472)
- A field experience (e.g., Education 420, 430, 498)

Three specializations and two teacher certification programs are available at the undergraduate level.

Agricultural Extension and Adult Education. Agricultural extension and adult education is a program that combines preparation in both the agricultural and social sciences. The program prepares students for teaching careers in agriculture/biotechnology in public schools, Cooperative Extension and extension and adult programs of agricultural businesses, government agencies, and a variety of private and not-for-profit organizations. Students take a college program that includes a balance of courses in education as well as courses on a technical area of agriculture/biotechnology, community/economic development, natural resources, human ecology, or communication. Education courses in issues in education, teaching and learning, methodology, and instructional applications of microcomputers prepare students to succeed as educators in a broad range of careers. Courses are selected to develop professional leadership and teaching competence. Students may elect to focus their study on one or more of these areas: agricultural education, extension education, or adult education. As an alternative, students may elect to major in one of the college's technical departments and co-advise to prepare in one or more of the three areas of agricultural, extension, and adult education. Further information is available from the agricultural extension and adult education coordinator, Kennedy Hall (Tel: 607/255–2197).

Educational Psychology. Studies in educational psychology have traditionally focused on teaching and learning in schools. Yet schools are only one location in which learning and teaching take place. An undergraduate emphasis in educational psychology at Cornell applies principles of teaching and learning to educational enterprises, broadly defined.

While graduate study is still required for many careers in psychology, an undergraduate emphasis in educational psychology provides excellent preparation for graduate work or for many post-baccalaureate positions. Educational psychologists develop and/or supervise training programs in business, industry, the military, and government; design and evaluate curriculum and instructional materials for publishers; develop tests for educational and professional associations; evaluate social programs; work in human resource management; and conduct applied research for educational research organizations.

Students interested in concentrating their studies in educational psychology complete a total of 21 hours in educational psychology and related courses. Working with a faculty adviser a student may design a program in one of a variety of applied areas: Instructional Systems Design and Development; Human Relations; Measurement and Evaluation; Individual and Social Development; or the Educational Psychology of Human Development.

Students interested in careers in educational psychology should apply for admission to the Education Department. For more information regarding a concentration in educational psychology, contact: Coordinator, Educational Psychology Program, Education Department, Kennedy Hall.

General Education. By selecting courses in the Department of Education, students can prepare for positions in areas such as counseling, youth group leadership, and the Peace Corps. Students can also prepare themselves for graduate programs in: environmental education; research methods; extension, adult and continuing education; and the social/economic/legal/philosophical foundations of education. Further information is available from the undergraduate coordinator, Kennedy Hall.

Teacher Certification

Teacher Education in Agriculture. Students completing the Cornell registered program earn grade 9–12 certification to teach agricultural subjects (animal science, plant science, agricultural mechanization, and business management), introduction to occupations, occupational science, and occupational mathematics; and the introduction to technology course required for all 7–8th grade students.

A passing grade on the National Teacher Examinations (NTE) and one year of agricultural work experience are required. Provisional (initial) certification is valid for five years. The master's degree required for permanent certification is offered through graduate study at Cornell.

Students may also be certified to teach selected science subjects (e.g., biology, earth science, and general science) and work as a diversified cooperative education work experience coordinator through direct application to the State Education Department. For more information contact the program coordinator, A. Berkey, at (607) 255-2197.

Teacher Education in Science and Mathematics. Students at Cornell may pursue teaching credentials in biology, chemistry, earth science, general science, mathematics, and physics. Teacher Education in Science and Mathematics (TESM) is a university program jointly conducted by the departments of Education and Mathematics. Although TESM offers options for undergraduate and graduate study, most students enroll in a five-year program, which combines an undergraduate major in mathematics or one of the sciences with a one-year Master of Arts in Teaching (MAT). Students from any college at Cornell are eligible to apply to the program as undergraduates. Undergraduate students in TESM do not normally major in education.

Students who complete their studies as undergraduates and their student teaching are normally eligible for provisional teaching certification from the State Education Department, effective for five years. Students completing the graduate program can earn the master's degree required for permanent certification.

For more information, contact the TESM Student Support Specialist at (607) 255-9255 or the program coordinator, D. Trumbull (607) 255-3108.

Entomology

The entomology curriculum provides students with a basic background in biological and environmental sciences, with a special emphasis in the study of insects. Majors may pursue graduate studies in entomology or related sciences upon completion of the B.S. degree. Alternatively, students may immediately begin careers in various aspects of integrated pest management. Because of this diversity of career options, the major includes a common core of requirements allowing flexibility in electives selected by the student in consultation with their adviser.

Specific Requirements

Basic Sciences

- College mathematics, including a course in calculus
- A year of physics
- Chemistry 103–104 or 207–208
- Chemistry 253 (organic)

General Biology

- Introductory Biology
- Biological Sciences 281, Genetics, or Plant Breeding 225, Plant Genetics
- A choice of one: Biological Sciences 261, Principles of Ecology **or**
- Biological Sciences 330 or 331, Principles of Biochemistry **or**
- Biological Sciences 378, Evolutionary Biology

Entomology

- Entomology 212, Insect Biology
- Entomology 322, Insect Morphology
- Entomology 331, Introductory Insect Systematics
- Entomology 483, Insect Physiology

It is strongly recommended that students who wish to undertake graduate training in entomology include course work beyond the minimum in their program, including enrollment in more than one of the general biology courses; i.e., ecology, biochemistry, and evolutionary biology. Students interested in pest management may include courses such as Entomology 241, Applied Entomology, Entomology/Plant Pathology 444, Integrated Pest Management, or other appropriate specialized courses.

Food Science

The food science program area is designed to provide students with the basic skills and knowledge necessary to ensure an adequate general food supply. Students take one of five specializations and select the courses that are appropriate for the chosen specialization. The five specializations are: basic science, engineering, processing, operation and management, and international development. The first three are designed to meet minimum guidelines of the Institute of Food Technologists, the professional society of U.S. food scientists. The flexibility of the food science program allows students to prepare for a variety of positions in industry, government, or education. Some of the positions and areas of work require graduate training. Opportunities for graduate study exist at a number of universities, including Cornell.

During the first two years, students are required to take the two-semester introductory courses in biology, chemistry, and physics plus introductory courses in microbiology, calculus, food science, and nutrition. During the last two years, students take courses dealing with the application of science and technology to the processing, preservation, distribution, and utilization of foods. This includes the following required courses: Food Analysis, Food Engineering I, Sanitation and Public Health, Food Processing I and II, Food Chemistry, Sensory and Objective Evaluations of Foods, Food Microbiology, Food Chemistry Laboratory, and introductory statistics. Students also take courses in the social sciences and humanities to meet the general college requirements.

Students may choose additional courses in chemistry, microbiology, or nutrition in preparation for careers in research and development; in mathematics and engineering, for careers in processing and engineering; in marketing and business management; or in a variety of production courses related to specific commodities. Emphasis may be placed on the international aspects of food science.

Students are strongly encouraged to obtain further competence in one or more areas of emphasis. Lists of recommended courses are available for many areas, but the student is free to select courses for special objectives. The areas of emphasis include processing technology; food chemistry; nutritional aspects of processing; technology and management; dairy science; meat, poultry, and fish technology; food microbiology; and international food development.

A state-of-the-art food processing and development laboratory, a full-scale dairy plant, and extensive research laboratory facilities are available for training, research, and employment.

Landscape Architecture Program

The Landscape Architecture Program focuses on the art of landscape design as an expression of cultural values combined with natural processes of the ambient environment. The

program's unique place within the university promotes interaction among the areas of horticulture, architecture, and city and regional planning. The program is co-sponsored by the colleges of Agriculture and Life Sciences and Architecture, Art, and Planning with the Department of Floriculture and Ornamental Horticulture.

The program offers a course of study that prepares students intellectually, technically, artistically, and ethically for the practice of landscape architecture. The curriculum focuses upon graphic communication, basic and advanced design methods, landscape history, plant materials, construction technology, theory, and professional practice. Design studios focus upon the integration of site requirements as applied to specific sites at a variety of scales. Projects range from urban design and housing to parks and garden design.

The Landscape Architecture Program offers three professional degree alternatives: a two-year graduate curriculum for those who have undergraduate degrees in landscape architecture or architecture, a three-year graduate curriculum for those who have a four-year undergraduate degree in another field and a four-year Bachelor of Science degree. Graduate studies in landscape architecture are administered through the Graduate School and lead to a Master of Landscape Architecture degree. Undergraduate studies in landscape architecture are administered through the College of Agriculture and Life Sciences.

Dual Degree Options

Graduate students can earn a Master of Landscape Architecture and a Master of Science or a Master of City and Regional Planning simultaneously. Students need to be accepted into both fields of study to engage in a dual degree program and must fulfill requirements of both fields of study. Thesis requirements are generally integrated for dual degrees.

Study Abroad

The faculty encourages study abroad and has two formally structured programs. The *Denmark International Study* (DIS) program is available primarily to senior undergraduates in their fall semester and is administered through Cornell Abroad. The *Rome Program* is made available to undergraduates and graduate students through the College of Architecture, Art, and Planning.

First Year

Fall Term	*Credits*
*FR DR 111/LA 141, Freehand Drawing	3
†Biological sciences elective	3
†Physical sciences elective	3
†Social sciences or humanities elective	3
†Written or oral expression elective	3
	15

Spring Term

*LA 142, Introduction to Landscape Architecture	4
†Biological sciences elective	3
†Social sciences or humanities elective	3
†Written or oral expression elective	3
‡Free elective	3
	16

Second Year

Fall Term

*LA 480, Principles of Spatial Design	3
*LA 201, Design, Theory, and Composition	6
Free elective	3
*HORT 335, Woody Plant Materials for Landscape Use	3
	15

Spring Term

*LA 202, Design, Composition, and Theory	6
*LA 522, History of European Landscape Architecture	3
†Written or oral expression elective	3
†Physical sciences elective	3
	15

Third Year

Fall Term

*LA 301, Site Design and Detailing	6
*LA 310, Site Engineering	4
*LA 521, History of American Landscape Architecture	3
*LA 491, Design and Plant Establishment	3
	16

Spring Term

*LA 302, Site Design and Detailing	6
Biological Sciences Elective	3
†Physical sciences elective	3
*LA 312, Site Construction	4
	16

Fourth Year

Fall Term

*LA 401, Urban Design and Planning	6
‡LA 520, Contemporary Issues in Landscape Architecture	2
†Social sciences or humanities elective	3
‡Free elective	4
	15

(Optional landscape architecture study abroad semester in Denmark or Rome)

Spring Term

*LA 402, Advanced Project Studio	6
†Social sciences or humanities elective	3
*LA 412, Professional Practice	1
*LA 492, Undergraduate Seminar	2
	12

Summary of credit requirements

*Specialization requirements	69
†Distribution electives	38
‡Free electives	13
	120

Master of Landscape Architecture (M.L.A.) Degree

Requirements of the three-year M.L.A. curriculum include 90 credits, satisfactory completion of the core curriculum courses, and a thesis.

First Year

Fall Term	*Credits*
*LA 505, Graphic Communication I	3
*LA 480, Principles of Spatial Design and Aesthetics	3
*LA 501, Design Composition and Theory	6
*HORT 335, Woody Plant Materials for Landscape Use	3
LA 520, Contemporary Issues	2
	17

Spring Term

*LA 502, Design Composition and Theory	6
*LA 522, History of European Landscape Architecture	3
LA 506, Graphic Communications II	3
‡Free elective	2
	14

Second Year

Fall Term

*LA 601, Site Project Planning and Application	6
*LA 610, Site Engineering for Landscape Architects	4
*LA 521, American History of Landscape Architecture	3
*LA 491, Design and Plant Establishment	3
	16

Spring Term

*LA 602, Urban Design and Planning	6
*LA 490, Graduate Seminar	3
*LA 612, Site Construction	4
‡Free elective(s)	4
	17

Third Year

Fall Term

*LA 701, Natural Systems Studio	6
*LA 531, Regional Planning	3
‡Free elective	2
	11

Spring Term

*LA 800, Master's Thesis in Landscape Architecture	9
*LA 412, Professional Practice	1
‡Free elective(s)	2
	12

Summary of credit requirements

*Specialization requirements	74
‡Free electives	16
	90

Second professional degree curriculum. The two-year Master of Landscape Architecture (M.L.A.) curriculum serves to broaden and enrich undergraduate education in design by providing an expanded educational experience to those who are technically skilled. Applicants are therefore expected to hold a bachelor's degree in landscape architecture or architecture from an accredited program.

The objectives of the two-year M.L.A. curriculum are to permit students to conduct research relating to landscape architecture and to provide advanced education and training to individuals who may wish to teach, practice, or conduct applied research in landscape architecture. Students are permitted considerable flexibility in establishing programs that take full advantage of the teaching and research resources of the university.

Students admitted to the two-year M.L.A. curriculum are required to complete 60 credits of course work as approved by the members of their graduate committee. This must include at least two advanced studios, a graduate seminar, and a thesis or final master's project.

Natural Resources

The undergraduate curriculum is designed to provide an enduring and broadly applicable education. The focus of study is on the systems that yield our renewable natural resources (water, forests, fish, and wildlife) and includes emphasis on both natural sciences and human organizations involved with resource management. Students are provided with an opportunity to understand the scientific, ethical, and societal basis for the protection and management of renewable resources through the application of ecological principles and knowledge of social needs.

Required Core Curriculum

Students who desire to graduate with a specialization in Natural Resources are expected to complete, as a minimum, the courses specified in the following two-part Core Curriculum. First is a broad group of courses taken primarily outside the department, which, as their presentation suggests (Groups A–D), also fulfill this college's course distribution requirements described on page 30.

Group A - Physical Sciences	*Total Hours*
Mathematics - 2 courses	6–8
Chemistry - 2 courses	7–8
Group B - Biological Sciences	
Introductory biology - 8 cr. hours	8
General ecology - 1 course	4
Group C - Social Sciences	
3 credits in addition to	
3 credits in economics	6
Humanities	
6 credits in addition to a course in "normative" ethics (e.g., NTRES 407, or PHIL 241, 246, or 247)	9
Group D - Written and Oral Expression	
Freshmen Writing Seminars - 2 courses	6
Oral communications - 1 course	3
Courses outside the Distribution Groups	
Statistics - 1 course	3
Computer applications, (e.g., NTRES 107) or programming - 1 course	3

The Core Curriculum's second portion is composed entirely of courses offered by the Department of Natural Resources; a minimum of 19 hours in department courses is required.

YEAR 1	*Total Hours*
One of 2 introductory courses:	3
NTRES 100 Principles of Conservation (Fall, 3 cr.)	
NTRES 201 Environmental Conservation (Spr., 3 cr.)	
YEAR 2	
All 4 courses listed:	
NTRES 210 Introductory Field Biology (Fall, 4 cr.)	4
NTRES 250, 251, 252 Introduction to Wildlife, Fishery Biology, and Forestry Biology, respectively (Spr., 1 cr. ea.)	3
YEARS 3 AND 4	
At least 3 of the following courses, with one from each group	
Ecology	3–8
NTRES 302 Forest Ecology (Fall, 4 cr.)	
NTRES 304 Wildlife Ecology (Spr., 3 cr.)	
NTRES 440 Fishery Science (Fall, alt. yrs., 3 cr.)	
NTRES 442 Techniques in Fishery Science (Fall, 5 cr.)	
Management	3–6
NTRES 303 Woodlot Management (Fall, 3 cr.)	
NTRES 308 Natural Resources Management (Fall, 3 cr.)	
NTRES 402 Nat. Res. Policy, Planning & Politics (Spr., 3 cr.)	
NTRES 410 Principles of Wildlife Management (Spr., 3 cr.)	
NTRES 438 Fishery Management (Spr., alt. yrs., 3 cr.)	

Students pursuing this specialization have remaining approximately 40 credit hours available to develop one or more concentrations of their choice within or outside this field.

Students who wish to do so may specialize further in wildlife science, forest science, fishery and aquatic science, or natural resource policy and management.

Opportunities for field-oriented studies are available at Cornell's nearby Arnot Teaching and Research Forest, the Cornell Biological Field Station on Oneida Lake near Syracuse, as well as at numerous natural areas near campus.

Students should seek relevant work experience to complement their academic studies.

Nutrition, Food, and Agriculture

Nutritional sciences draws upon chemistry, biology, and the social sciences to understand complex relationships among human health and well-being, food and lifestyle patterns, food and agricultural systems, and social and institutional environments.

The program in nutrition, food, and agriculture was established in 1990 to provide students with strong training in human nutrition in the context of an understanding and appreciation of the agricultural and life sciences. The program responds to the growing and important interrelationships between human nutrition and the agricultural and life sciences. Growing public interest in health and nutrition has placed new demands upon food producers, processors, and retailers. The problems of hunger and malnutrition in the United States and abroad require that nutritionists work together with specialists in areas such as agricultural economics, food production, and rural sociology. Advances in biotechnology provide researchers with new ways to understand human nutritional requirements and the regulation of human metabolism.

Nutrition, food, and agriculture majors complete a core set of requirements and choose elective courses in the areas of their particular interest. The core curriculum includes introductory chemistry and biology, organic chemistry, biochemistry, physiology, and mathematics. Students complete five courses in nutritional sciences: NS 115 Nutrition and Health Concepts and Controversies, NS 245 Social Science Perspectives on Human Nutrition, NS 345 Nutritional and Physicochemical Aspects of Foods, NS 331 Physiological and Biochemical Bases of Nutrition, and NS 332 Methods in Nutritional Sciences. In addition, students select a minimum of three advanced courses in nutritional sciences as well as elective courses in the broad areas of food production and processing, food and agricultural policy, and the life sciences.

All majors have faculty advisers in the Division of Nutritional Sciences with whom they meet regularly. Advisers help students plan course schedules and help find opportunities for special study or experiences outside the classroom.

Many students engage in laboratory or field research with a faculty member for academic credit or, in some cases, as employment. The honors program is designed for academically talented students who are interested in research. Honors students conduct independent research projects under the guidance of a faculty member and prepare an honors thesis. Many students participate in field experiences for credit during the academic year or summer. Placements in laboratories, industries, or community agencies are possible.

The major in nutrition, food, and agriculture can lead to many different career paths. By supplementing the core requirements with courses in different areas, students can prepare for jobs in industry, government, or community agencies in the United States or abroad. The major is excellent preparation for graduate study in a variety of fields.

The Division of Nutritional Sciences is affiliated with both the College of Agriculture and Life Sciences and the College of Human

Ecology. Most of the Division faculty members work in Savage Hall and Martha Van Rensselaer Hall. In addition to housing offices, classrooms, and seminar rooms, these buildings contain research facilities, specialized laboratories, a human metabolic research unit, and computer facilities. The nutritional sciences Learning Resource Center in Martha Van Rensselaer Hall is used by students for study and small group discussion. The center contains class materials, audiovisual aids and supplementary books and periodicals for independent study and special projects.

For additional information about the nutrition, food, and agriculture program, contact the Division of Nutritional Sciences Academic Affairs Office, 335 MVR, (607) 255-2628.

Plant Sciences

Plant sciences students may specialize in general plant science, plant biology, plant breeding, plant pathology, plant protection, or horticultural sciences, including floriculture and ornamental horticulture, pomology, and vegetable crops. Students with well-defined interests may specialize when they enter college. Others may start in the general plant sciences curriculum and, if they desire, specialize after the second year.

Plant sciences is a multidepartmental program area, sponsored by the Department of Plant Breeding in Emerson Hall, and the departments of Floriculture and Ornamental Horticulture, Plant Pathology, Pomology, and Vegetable Crops, all located in the Plant Science Building.

General plant science is intended for students whose interest in studying plants has not yet centered on any one of the more specialized groups within the area. Students may continue with this option throughout their undergraduate years, particularly if they are likely to be interested in and qualified for advanced studies beyond the bachelor's degree. Students who plan to seek employment upon graduation may prefer to specialize. There are, however, opportunities for general plant science graduates at the bachelor's degree level in the service and supply industries, as extension agents, as teachers, and as research technicians.

More than one hundred courses are offered that deal directly with some area of plant science. Other courses relating to plant science are offered in agronomy and biological sciences. In addition, an interest in plant science may be combined with some other area of specialization, such as agricultural and biological engineering, education, extension, statistics, international agriculture, food science, or agricultural economics.

Undergraduates are encouraged to obtain practical experience. It may involve research under the direction of a faculty member or work in a commercial industry or research institute or on a farm. Departments will assist students looking for positions that would provide useful experience.

Floriculture and ornamental horticulture applies principles of plant science and business management to the production and marketing of florist, nursery, and turfgrass crops, as well as to the selection and management of plants for both indoor and outdoor landscapes. Programs prepare students for careers at the professional and managerial levels in horticultural business, research, teaching, communications, and extension and public education.

The core curriculum consists of the following courses:

Hort 101, Introduction to Horticultural Science
Hort 102, General Horticulture
Hort 230, Woody Plant Materials
Hort 300, Garden and Interior Plants I
Hort 400, Principles of Plant Propagation
Bio S 241, Plant Biology (Introductory Botany)
Bio S 242, Plant Physiology (lecture)
Bio S 244, Plant Physiology (laboratory)
SCAS 260, Introduction to Soil Science
Entom 241, Applied Entomology, or Entom 212, Insect Biology
Pl Pa 301, Introductory Plant Pathology

Although mastery of these subject areas is considered essential for students planning to enter a floriculture or landscape horticulture career, justifiable exceptions to the core curriculum may be granted by the student's adviser.

With permission of the adviser, a transfer student may receive core curriculum credit for similar courses taken at other institutions provided that transfer credit is granted by the college. In addition, all transfer students must complete a minimum of 12 credits in floriculture and ornamental horticulture courses at Cornell. No more than two of the following landscape architecture courses may be included in this 12-credit requirement: LA 142, 311, 312, 480, 490, 491. No other landscape architecture or freehand drawing courses may be applied to the requirement because they do not contain horticultural subject matter.

Students may select an area of emphasis in either floriculture or landscape horticulture. Specialization in floriculture prepares students for careers in management of the production of crops in greenhouses and wholesale- and retail-florist marketing, whereas specialization in landscape horticulture trains students for careers in nursery-crop production, turfgrass management, landscape contracting and service, retail- and wholesale-marketing of nursery products and services, botanical garden and arboretum management, urban horticulture, and related areas. Some students choose to pursue a general program in floriculture and landscape horticulture including courses in both areas. Similarly, programs in horticultural business management, research, teaching, extension and public education, and communications/journalism may be arranged across two specialization areas. Students wishing to prepare for graduate study in horticultural science may develop a program in basic sciences and their application in horticultural science. Lists of recommended courses for the areas of specialization are available from student advisers and from the undergraduate program coordinator.

Working with his or her faculty adviser, each student will tailor a program to achieve individual educational objectives in floriculture, landscape horticulture, horticultural business management, or general horticultural science. A core of management courses also is recommended for students planning horticultural business careers. Students are also encouraged to take courses in these areas: agricultural and biological engineering, soil science, computer science, ecology, entomology, geology, plant breeding, plant pathology, plant physiology, oral and written expression, plant taxonomy, and weed sciences. Use of electives to pursue study in the humanities and in other areas of special interest to the student is encouraged. Numerous opportunities to become familiar with the horticultural industries and professions are provided through field trips, guest lectures, undergraduate seminars, independent or small-group study, optional internships, and work-experience programs.

Questions concerning the undergraduate curriculum, advising, and related manners should be addressed to Dr. Carl F. Gortzig, Undergraduate Program Coordinator, Department of Floriculture and Ornamental Horticulture, 23 Plant Science Building, Ithaca, New York 14853-5908 (telephone: 607/255-1787).

The department's office is 20 Plant Science Building. Departmental facilities include classrooms and laboratories in the Plant Science Building, greenhouse and laboratory facilities at the Kenneth Post Laboratory, the Test Garden, the Turfgrass Research Field and Laboratory, landscape architecture studios on the fourth floor, Roberts Hall (entrance Kennedy Hall), and freehand drawing studios in Mann Library.

Plant biology provides undergraduates with preparation for graduate study in the plant sciences that stresses basic, rather than applied, research. In cooperation with an adviser, each student plans a curriculum with a concentration in basic sciences supplemented by courses in applied areas that seem appropriate. Options include molecular biology, plant physiology, plant biology, genetics, cytology, organic chemistry, biochemistry, anatomy, taxonomy, ecology and evolution, and statistics. A core of courses, including mathematics, plant biology and physiology, and cytology, is strongly suggested. However, different specialties within plant biology afford a flexible curriculum.

Plant breeding provides undergraduates with (1) preparation for graduate study leading to advanced degrees in plant breeding and plant genetics and (2) preparation for work in producing and marketing plant varieties and making varietal recommendations and for positions in seed analysis, regulation, and quality control.

In cooperation with an adviser, each student plans a curriculum with a concentration in basic sciences supplemented by courses in applied fields best suited to his or her individual goals. Options include plant breeding and plant genetics; genetics, cytology, and cytogenetics; mathematics (calculus) and statistics; organic chemistry and biochemistry; plant anatomy, ecology, and physiology; crop production; and plant pathology and disease control.

Plant pathology requires broad training in the physical and biological sciences and a general background in crop production with emphasis on crop protection. Specific requirements depend upon a student's career interests. Career options include working as a mycological or microbiological technician, biological research technician, technical representative for agricultural industry, cooperative extension agent, plant protection technician, or biology teacher. Students may also be interested in graduate work in plant pathology or some other area of biology.

A core of basic and applied courses is strongly suggested, including chemistry, mathematics, physics and biological sciences, plant breeding, and plant pathology. Courses chosen from soil, crop, and atmospheric sciences, entomology, floriculture and ornamental horticulture, pomology, or vegetable crops complete the program.

Plant protection is offered for students who are interested in pest management or plant protection. The study of insects, diseases, weeds, vertebrate pests, and other factors that prevent maximum crop production may prepare students for careers in agribusiness, the agrichemical industry, cooperative extension, pest management consulting, state and federal regulatory work, and a variety of other technical positions. Although designed as a terminal program for students desiring a practical preparation in general plant protection, this specialization may also provide an adequate background for graduate work in entomology, plant pathology, or weed science.

The following subjects are considered essential to the plant protection specialization: botany and plant physiology, general ecology, soils, crop science, and microbial ecology. Additional courses in introductory entomology, integrated introductory plant pathology, plant disease control, weed science, and integrated pest management are recommended. Students should plan to take a total of 62 to 70 credits in courses required and recommended for the specialization.

In addition, a number of other subjects pertinent to plant protection are recommended, depending upon the student's interests: agricultural economics, agricultural and biological engineering, soil, crop, and atmospheric sciences, biochemistry, communication, pathology and entomology, general physics, genetics, meteorology, mycology, pesticides in the environment, and plant anatomy. Employment involving practical experience in plant protection between the junior and senior years is encouraged. The job may be on a farm, at an experimental station, with an agrichemical company, or with a regulatory agency.

Pomology (the science of fruit growing) provides students with knowledge of the scientific technology and the influence of environmental factors on the production, handling, and storage of deciduous fruit crops. New York is a national leader in fruit production. An on-farm value of over $155 million generates an estimated $620 million for the state's economy.

Courses are selected by students in consultation with a faculty adviser. Flexibility in programs makes it possible to establish a course of study to fit the desired goals of individual students. The diverse pomology curriculum, complemented by courses in basic sciences and arts and electives in a student's area of interest, prepares pomology majors for a career in fruit production, agricultural business related to the fruit industry, storage and merchandising, or professional pomology. Job opportunities for graduates can be found in fruit production, marketing, sales and service, research, teaching, and extension.

Vegetable Crops is offered for students with an interest in either applied or basic aspects of vegetable production. The high value of vegetables and their importance in the human diet assures a continued demand for trained personnel in all aspects of vegetable technology. A flexible curriculum is provided to prepare undergraduates for careers in a diversity of fields, including: horticultural research, teaching, extension, production, processing, and marketing. A faculty adviser assists individual students in the selection of courses, which usually include: general horticulture, soils, botany, vegetable types and identification, vegetable production, and post-harvest handling or marketing. Additional course work depends upon the interest of the student, and may include: vegetable physiology, plant breeding, entomology, plant pathology, weed science, ecology, soil, crop, and atmospheric sciences, nutritional science, agricultural economics, international agriculture, and agricultural and biological engineering.

The vegetable industry is an economically important component of agriculture in New York and in the United States. Recently, there has been increased interest in growing vegetables in tropical countries. Exciting challenges are facing the industry. Greater awareness of environmental and health issues is driving a change toward farming practices that depend less upon agricultural chemicals than in the recent past. New technologies are being developed and implemented to help growers make this change while remaining profitable. Among these technologies are: integrated pest management, genetic engineering, breeding for insect and disease resistance, low-input and organic cropping systems, and cultural practices that improve production efficiency and conserve agricultural resources.

The Department of Fruit and Vegetable Science has on-campus greenhouses and laboratories as well as two research farms in the Ithaca area that support our teaching program. Students are encouraged to gain hands-on experience growing vegetables and to pursue their individual interests through course work and by taking advantage of the many resources available in the College of Agriculture and Life Sciences.

Rural Sociology

Technological, economic, demographic, and environmental changes are social processes, and each has major impacts on individuals, social groups, societies, and the international order. At Cornell, rural sociology students study these and other facets of social change in both domestic and international settings. Among the topic areas in which faculty members in the Department of Rural Sociology specialize are international agricultural and rural development, community and regional development and changes in the United States, environmental sociology, sociology of agriculture, rural industrialization and labor markets, technology and social change, population and development, political economy, gender and social change, and research methodology. Students acquire background in one or more of these areas by specializing in one of the three concentrations described below. Each of the concentrations, through its required courses, provides background in both domestic and international aspects of the subject matter. Normally, students will develop a specialization with either a domestic or international emphasis by choosing appropriate elective courses for their concentration. Regardless of the area of specialization, however, all students learn the theory and methodology of sociology and how to apply both to research and policy in their subject areas.

Recognizing that students are concerned with future career opportunities, the undergraduate program emphasizes acquisition of skills as well as general knowledge in preparation for jobs or further study upon graduation. Accordingly, students are expected to become involved in the application of theory, methodology, principles, and concepts in the analysis of practical problems. The concentration in social data and policy analysis is particularly well suited to providing skills in research and policy analysis that will be useful for students who wish to obtain employment after completion of the baccalaureate degree.

Rural sociology offers degree programs at both the undergraduate and graduate levels (B.S., M.S., M.P.S., or Ph.D.). These programs are offered through the Department of Rural Sociology and the Graduate Field of Development Sociology, both of which are located in Warren Hall. For many years, the department and graduate field have been recognized as among the top programs in the country, and both are known for innovative program orientations. The department is particularly well known for providing instruction in international as well as domestic aspects of development, environmental sociology, sociology of agriculture, population studies, and other topics. Faculty members in this department are committed to both quality instruction and research programs.

Being located in a college of agriculture, faculty members maintain strong ties with the technical fields in the college as well as with the International Agriculture Program, the Biology and Society Program, the Cornell Institute for Social and Economic Research, the Women in Development Program, the Rural Development Program, the Hispanic Studies Program, the Program on Science, Technology, and Society, and the Center for International Studies. Nearly half of the department faculty are associated with one or more area studies programs (the Southeast Asia Program, South Asia Program, Latin American Studies Program, East Asia Program, or the Institute for African Development). Department members also maintain working relations with faculty in the Department of Sociology and other social science units located in other colleges at Cornell. Students are encouraged to supplement their course work by electing courses in these other departments and programs, thereby rounding out their educations by acquiring different perspectives.

The undergraduate concentrations offered in rural sociology include development sociology; population, environment, and society; and social data and policy analysis. The concentrations vary in terms of course requirements and credits needed for graduation.

All students majoring in rural sociology are expected to take four core courses: an introductory course (R Soc 101), methods (R Soc 213), theory (R Soc 301), and a course in statistics.

The concentration in development sociology provides an understanding of the processes and policies that influence social and economic development in rural settings in North America and low-income countries in the developing world. The required courses

provide background in the sociology of development in both the advanced and developing countries. Students normally select a set of elective courses in which either domestic or international development is emphasized. The required and elective courses provide background in several aspects of development sociology, including (1) an understanding of the processes of socioeconomic development in low-income or Third World countries and training in the formulation of strategies to enhance the socioeconomic well-being of citizens of those countries,
(2) analysis of the social structures and processes for development in nonmetropolitan settings in the United States, (3) analysis of the processes of agricultural change and development in industrialized and low-income countries, and (4) an understanding of the processes of technological development and change in agriculture and other rural industries in developed and developing countries.

Students are encouraged to complement courses in the department with course work in the history and economics of development, area studies, and the policy sciences.

Total credits required, including the four core courses: 27

Courses Required	*Credits*
R Soc 205, Rural Sociology and International Development	
or R Soc 208, Technology and Society	3
R Soc 370, Comparative Issues in Social Stratification	3
R Soc 425, Gender Relations and Social Change or	
R Soc 436, Small Towns in Metropolitan Society: Changing Structures and Quality of Life	3
	9

Electives for the Concentration

At least six credits must be selected from a list of complementary courses for the concentration in development sociology. The list of courses is available in 133 Warren Hall.

The concentration in population, environment, and society provides an understanding of (1) the causes and consequences of the major components of population change—fertility, mortality, and migration; (2) the major patterns of population distribution and population characteristics in the United States and the developing world, (3) the relationships between social structure and the biophysical environment, and (4) the relationships between population change and natural resource utilization in development. Students normally select the elective courses for the major in such a way as to stress either population studies or sociological aspects of natural resources and the environment.

Students are encouraged to complement courses in the department with course work in demographic methods, household analysis, ecology and evolution, environmental studies, and natural resources.

Total credits required, including the four core courses: 27

Courses Required	*Credits*
R Soc 201, Population Dynamics	3
R Soc 324, Environment and Society	3
R Soc 438, Social Demography, or R Soc 440, Social Impact of Resource Development	3
	9

Electives for the Concentration

At least six credits must be selected from a list of complementary courses for the concentration in population, environment, and society. The list of courses is available in 133 Warren Hall.

The concentration in social data and policy analysis provides (1) in-depth knowledge of research methodology, statistics, and computer applications, (2) an understanding of social, economic, political, and historical concepts essential for conducting meaningful analyses of practical problems and issues faced by organizations, communities, regions, and states, and (3) knowledge and practice in policy analysis. Students ordinarily select electives for the concentration in order to specialize in either policy analysis or in a particular area of public policy (international development policy, domestic rural development policy, environmental policy, or population policy).

In addition to the required courses listed below, students in the concentration in social data and policy analysis are required to take Soc 301, Evaluating Statistical Evidence, as their statistics course for meeting the core requirements of the major.

Students are encouraged to complement courses in the department with course work in data collection and research design, evaluation research, computing, and advanced statistics.

Total credits required, including the four core courses: 27–29

Courses Required	*Credits*
R Soc 201, Population Dynamics, or R Soc 205, Rural Sociology and International Development, or R Soc 206, Gender and Society, or R Soc 208, Technology and Society	3
Soc 303, Primary Data Collection and Design [4 credits], or HSS 292, Research Design and Analysis, or Comm 382, Survey Research Methods	3–4
ABEN 102, Introduction to Microcomputer Applications, or CRP 421, Introduction to Computers in Planning [4 credits]	3–4
	9–11

Electives for the Concentration

At least six credits to be selected from a list of complementary courses for the concentration in social data and policy analysis. The list is available in 133 Warren Hall.

Brochures are available from rural sociology faculty members.

Soil, Crop, and Atmospheric Sciences

The Soil, Crop, and Atmospheric Sciences department provides instruction in five specializations: agronomy, crop science, atmospheric science, soil science, and weed science. Many students pursue a general program in the department to maximize job opportunities upon graduation. Specialization is required at the graduate level.

Agronomy combines the study of crop production and soil management. It provides the student with a broad array of career opportunities after completion of the B.S. degree, including agricultural business, extension service work, and farming. Graduate school can also follow a well-planned program. The student should take at least 12 credits of crops and 12 credits of soils and design the remainder of his or her curriculum to meet specific interests and goals.

Crop science is the application of basic biological and ecological concepts to the production and management of field crops such as alfalfa, corn, soybeans, and wheat. Courses required include 18 credits of crops, 12 credits of plant biology, and 6 credits of soils. Students who anticipate a career in agricultural production or service after completion of the B.S. degree should take additional courses in economics, communication, plant pathology, entomology, and nutrition. Students planning graduate or professional study beyond the bachelor's degree should take advanced course work in organic chemistry and biochemistry, calculus, physics, and statistics.

Atmospheric science is the study of the atmosphere and the processes that shape our weather. The core curriculum in meteorology is designed to provide students with an understanding of the fundamental physical and dynamic properties and processes of the atmosphere. All students are required to complete a minimum of three semesters of calculus; two semesters of physics; a semester each of chemistry, computer science, and statistics; and a sequence of eight courses covering observational, general, theoretical, and synoptic meteorology. Additional courses are available for students interested in subjects of agricultural meteorology, climatology, physical meteorology, and statistical meteorology. The curriculum satisfies the basic requirements for employment as a professional meteorologist and provides a sound background for graduate study or work in the numerous specialized areas of meteorological science. Students are encouraged to choose additional course work in related or complementary areas of interest, such as agriculture, biology, computer science, mathematics, statistics, physics, chemistry, or engineering.

Soil science is the application of basic physical and biological science to the classification, use, and management of soils on an ecologically sound basis. The curriculum in soil science combines training in the physical and biological sciences with a thorough background in soil science. Students take 18 credits in soil science, including 4 credits in the introductory course. In addition, chemistry, mathematics, physics and plant physiology are required, as well as 6 credits of crops to satisfy the major.

Weed science is that branch of pest management which emphasizes the principles and practice of weed control. The scientific basis for mechanical, cultural, chemical, and biological control procedures is considered. Plant physiology, organic chemistry, biochemistry, soil science, and plant taxonomy are required in addition to twelve credits in weed science and plant protection. The specializa-

tion is offered cooperatively by the departments of Soil, Crop, and Atmospheric Sciences, Floriculture and Ornamental Horticulture, and Vegetable Crops so that a variety of managed plant systems may be studied.

Statistics and Biometry

Statistics is concerned with quantitative aspects of scientific investigation: design, measurement, summarization, and drawing conclusions based on probability statements. Biometry is the application of mathematical and statistical techniques to the life sciences. Students with ability in mathematics and an interest in its applications will find this a challenging specialization.

The work of a statistician or biometrician can encompass research, teaching, consulting, and computing in almost any mix and in a wide variety of applications. Opportunities for employment are abundant in universities, in government and in businesses and industries ranging from large corporations to small consulting firms, and salaries are usually excellent.

While satisfying course requirements for a specialization in statistics and biometry, students can also take a wide variety of courses in other disciplines. In fact, students are encouraged to take courses in applied disciplines such as agriculture, biology, economics, and the social sciences that involve numerical data and their interpretation.

Students specializing in this area are required to take at least two computer science courses (e.g., Computer Science 100 and 211), mathematics courses (at least three semesters of calculus), and statistics courses (Statistics and Biometry 200, 215, 408–409, 417, 601–602 and 607 and Industrial and Labor Relations 310). Work experience gained through summer employment or undergraduate teaching is highly recommended. Students should contact Steven J. Schwager for information.

Special Programs in Agriculture and Life Sciences

Some students are interested in pursuing a general education in the agricultural sciences. Others are uncertain about career objectives in agriculture and the life sciences. The opportunity to develop an independent major in general studies in agriculture and the life sciences is available for such students. In consultation with a faculty adviser, they may plan a sequence of courses suited to their individual interests, abilities, and objectives in an area not encompassed by the existing programs. In addition to the distribution and other college requirements, this major may include a concentration of courses in one or several academic units of the university.

Students completing this major are often planning a career in agriculturally related food and service enterprises. Many of the fast-growing occupations require the broad perspective, the scientific and technical skills, the attitudes, and the analytical ability that a general education fosters. A course of study for a special program must be planned with and approved by a college faculty adviser. Information on the options and names of faculty advisers prepared to advise in special programs are available in the Office of Student Services, 140 Roberts Hall.

General studies includes production agriculture as well as technical work in the agricultural and life sciences. Many biotechnology concerns deal with aspects of agriculture, especially plants, crops, and ecosystems in the natural environment. A strong grounding in biological sciences as well as knowledge of the agricultural sciences is essential in this rapidly growing field. Students should plan basic course work in the major areas of study in the college—animal sciences, plant sciences, environment and technology, agronomic sciences, biological sciences, and social sciences. Advanced courses may be selected in those and other areas of individual interest or career aspiration.

International agriculture provides students with an understanding of the special problems of applying basic knowledge to the processes of agricultural development in low-income countries. The student typically specializes in a particular subject and works with an adviser to plan a program oriented toward international agriculture. The courses in International Agriculture are designed to acquaint students with the socio-economic factors in agricultural development, with the physical and biological nature of tropical crops and animals, and with various world areas for which study programs exist. Competence in a foreign language is required.

In addition to the college distribution requirement of 36 credits, students majoring in international agriculture must take a minimum of 30 credits. A minimum of 7 credits in International Agriculture and 8 credits (or equivalent competence) in a modern foreign language are required. The other courses recommended are drawn from a wide range of disciplines. The objective is to acquaint students with the many facets of agricultural development in low-income countries. Students are encouraged to take additional specialized courses in one of the other program areas of the college.

DESCRIPTION OF COURSES

Undergraduate and graduate courses in the college are offered through the sixteen academic departments and units and also through the Divisions of Biological Sciences and Nutritional Sciences.

Descriptions of courses, both undergraduate and graduate, are given by department, arranged in alphabetical order.

Graduate study is organized under graduate fields, which generally coincide with the departments. Graduate degree requirements are described in the Announcement of the Graduate School. Courses for graduate students are described in the section on the academic department that offers them.

NONDEPARTMENTAL COURSES

ALS 127 Introduction to Farm Techniques

127, fall and spring. 1 credit each semester. Prerequisite: permission of instructor. S-U grades only. Limited to 8 students per section.

T or W, 1:25–4:30. Class assembles in the lobby of Roberts Hall for transport to various facilities. G. Tennant, staff.

Practical instruction in the basic skills of farming and field research. Includes safe tractor and equipment operation and maintenance; harvesting and planting crops; caring for and handling dairy and beef animals, sheep, and poultry; and milking by machine and by hand. General orientation in the day-to-day procedures of farm operation. Field trips to area farms and agribusinesses will provide knowledge of farmers' skills, problems, and way of life.

ALS 400 Internship

Fall, spring, or summer. 6 credits maximum. Not open to students who have earned internship credits elsewhere or in previous terms. S-U grades only.

Staff.

Students may register only for internships approved by the College Internship Committee. Currently, the opportunities are available in the New York State Assembly Intern Program, the New York State Senate Session Assistant's Program, and the Albany Semester Program. A learning contract is negotiated between the student and the faculty supervisor, stating conditions of the work assignment, supervision, and reporting. Participation is required in any structured learning activities associated with the internship.

ALS 500 Cornell-in-Washington Program

Agriculture and Life Sciences students may register for this course when they are accepted for the public policy portion of the Cornell-in-Washington Program. An assignment with a suitable externship of at least 25 hours per week is expected. Students must satisfy the requirements of the relevant core instruction in methods and policy offered for externs, including any papers required. Credit and grading will be that designated by the CIW Program for the term taken. Applications are made through the Department of Government, 134 McGraw Hall.

Staff.

Students may register only for internships approved by the College Internship Committee. Currently, the opportunities are available in the New York State Assembly Intern Program, the New York State Senate Session Assistant's Program, and the Albany Semester Program. A learning contract is negotiated between the student and the faculty supervisor, stating conditions of the work assignment, supervision, and reporting. Participation is required in any structured learning activities associated with the internship.

ALS 661 Environmental Policy (also Biological Sciences 661 and Biology and Society 461)

Fall and spring. 3 credits each term. (Students must register for 6 credits each term since an "R" grade is given at the end of the fall term.) Limited to 12 students. Prerequisite: permission of instructor.

Sem R 2:30–4:30 p.m. D. Pimentel.

This course uses an interdisciplinary approach to focus on complex environmental and energy problems. Ten to twelve students, representing several disciplines, investigate significant environmental problems. The research team spends two semesters preparing a scientific report for publication in Science or BioScience.

Related Courses in Another Department

Agriculture, Science and Society (History 233)

Seminar in the History of the Agricultural Sciences (History 687)

AGRICULTURAL AND BIOLOGICAL ENGINEERING

R. B. Furry, chair; L. D. Albright, D. J. Aneshansley, J. A. Bartsch, J. K. Campbell, T. J. Cook, J. R. Cooke, A. K. Datta, R. C. Derksen, K. G. Gebremedhin, W. W. Gunkel, D. A. Haith, P. E. Hillman, J. B. Hunter, W. W. Irish, L. H. Irwin, W. J. Jewell, H. A. Longhouse, D. C. Ludington, J.-Y. Parlange, R. E. Pitt, G. E. Rehkugler, T. S. Steenhuis, M. B. Timmons, L. P. Walker, M. F. Walter

ABEN 102 Introduction to Microcomputer Applications
Fall. 3 credits. S-U grades optional. Each lab section limited to 16 students. All students, including those pre-enrolled, must attend the first lecture to guarantee admittance to the course.
Lecs, T R 10:10 or 12:20; lab M 1:25–4:25 or 7:30–10:30 p.m., or T 1:25–4:25, or W 1:25–4:25 or 7:30–10:30 p.m., or R 1:25–4:25. 1 evening prelim. P. E. Hillman.
An introduction to the use of application packages on microcomputers, using primarily the Macintosh. An attempt will be made to assess and demonstrate the capability and limitations of the current generation of personal computers by using software for word processing, spreadsheets, database, and other applications. The course will involve very little programming using high-level languages.

ABEN 110 Introduction to Metal Fabrication Techniques
Spring. 2 credits. Each lab limited to 18 students.
Lec, R 9:05; lab, M or T or R 1:25–4:25, or M 7–10 p.m. T. J. Cook.
Emphasis on selection of proper materials and techniques to accomplish a variety of metal fabrication and maintenance projects. To include both hand and machine tools, fasteners, strengths of materials, classification and identification of metals, soldering, brazing, forging, pipe fitting, sheet metal work, controlling distortion, oxy-acetylene cutting, and arc welding.

ABEN 132 Introduction to Wood Construction
Fall. 2 credits. Each lab limited to 15 students.
Lec, T 9:05; lab, T or W or R 1:25–4:25, or M 7–10 p.m. T. J. Cook.
Principles and practice of wood construction. To include site selection and preparation, drainage, water and septic development, footers and foundations, material properties, framing and roofing, comparison of alternatives to wood construction, use of hand and power tools, wood joining methods, fasteners, concrete work, and block construction. Each student will plan and construct an approved carpentry project.

[ABEN 150 Engineering Applications of Spreadsheet Programs
Fall. 1 credit. S-U grades optional. Not offered 1992–93.
Lab, M 1:25–4:25. L. D. Albright.
Computer spreadsheet techniques applied to problems in engineering and the sciences, using personal computers (IBM compatible). Topics include: basic uses of spreadsheet programs, data analysis, simulations, graphing, macros, data base techniques. The class meets for one laboratory session per week; limited work outside of class may be required to complete assignments.]

ABEN 151 Introduction to Computing
Fall. 4 credits.
Lecs, M W F 11:15; lab, W or R 12:20–2:20 or 2:30–4:30, or F 1:25–3:25. Each lab section limited to 22 students.
L. D. Albright.
An introduction to computer programming and concepts of problem analysis, algorithm development, and data structure in an engineering context. The structured programming language, Pascal, is used, implemented on interactive personal computers, and applied to problems of interest in agricultural and biological engineering. No previous programming experience is assumed.

ABEN 153 Engineering Drawing
Fall. 2 credits. Limited to 30 students (15 in each lab).
Lec, M 9:05; lab, T or W 1:25–4:25.
H. A. Longhouse.
Designed to promote an understanding of engineering universal graphic language. The lectures and laboratories develop working knowledge of drawing conventions, drafting techniques, and their application to machine and pictorial drawing problems. The course will involve both instrument and Autocad computer drawings.

ABEN 200 Undergraduate Seminar
Spring. 1 credit. S-U grades optional.
Lec, T 1:25. L. D. Albright.
A forum to discuss the contemporary and future role of agricultural and biological engineering in society. A required course for freshmen majors in Agricultural and Biological Engineering academic programs. A series of seminars will be given by practicing engineers, Cornell faculty members, and students. Students are expected to develop written career statements and select future courses to meet their career goals.

ABEN 204 Introduction to Computer Uses
Spring. 4 credits. Each lab section limited to 20 students. S-U grades optional.
Lecs, T R 11:15; lab, T or W or R 12:10–2:15. 2 evening prelims. P. E. Hillman.
An introductory course in computing for those interested in using microcomputers to handle data. Topics include preparing and processing computer programs in Pascal and FORTRAN. No prior knowledge of computers or computer languages is necessary.

ABEN 221 Plane Surveying
Fall. 3 credits. S-U grades optional.
Lecs, M W 12:20, lab, M 1:25–4:25.
H. A. Longhouse.
Principles and practice of measurement of distance, elevation, and direction. Use and care of equipment is stressed during field problems related to mapping, engineering design, and construction. Other topics include surveying specifications, error analysis, and standards of accuracy.

ABEN 250 Engineering Applications in Biological Systems
Fall. 3 credits. Prerequisite: enrollment in an engineering curriculum. Recommended for the sophomore year.
Lecs, M W F 12:20. R. E. Pitt.
Case studies of engineering problems in agricultural and biological systems, including animal and crop production, environmental problems, energy, biomedicine, and food engineering. Emphasis is on the application of mathematics, physics, and the engineering sciences to energy and mass balances in biological systems.

ABEN 301 Introduction to Energy Technology
Spring. 3 credits. Prerequisite: high school or college physics. S-U grades optional.
Lecs, M W F 10:10. D. C. Ludington.
Basic concepts of energy; traditional sources, conversion processes to provide usable forms of energy and environmental impact; concepts of energy conservation and reducing environmental impact; alternate sources of energy and their potential.

ABEN 305 Principles of Navigation
Fall. 4 credits.
Lecs, M W F 9:05 or 12:20; rec, R 9:05 or 12:20. W. W. Gunkel.
Coordinated systems, chart projections, navigational aids, instruments, compass observations, tides and currents, soundings. Celestial navigation: time, spherical trigonometry, motion of stars and sun, star identification, position fixing. Nautical Almanac. Electronic navigation.

ABEN 310 Advanced Metal Fabrication Techniques
Spring. 1 credit (2-credit option available). Prerequisite: ABEN 110 or permission of instructor.
Lab F 1:25-4:30. T. J. Cook.
Principles and practices extending beyond the scope of ABEN 110. To include out-of-position, high carbon steel and cast iron welding. Soldering and brazing of aluminum, hard surfacing, both tungsten (TIG) and metallic (MIG) inert gas welding, plasma-arc and oxy cutting of metals. Planning, development, and fabrication of a metal construction project for the 2 credit option.

[ABEN 311 Farm Machinery
Fall. 3 credits. Each lab limited to 16 students. Prerequisite: high school physics or equivalent. Not offered 1992–93.
Lecs, T R 11:15; rec-lab, T or W 1:25–4:25. Staff.
A study of the operating principles, use, selection, and methods of estimating costs of owning and operating machines for field work. Lab work includes practice in the calibration of planting, fertilizing, and pesticide application machinery, and study of the functional characteristics of field implements.]

[ABEN 312 Engines and Tractors for Agricultural Applications
Spring. 3 credits. Each lab limited to 16 students. Students missing the first week of classes without permission of the instructor are dropped so others may register. Prerequisite: high school physics or equivalent. Not offered 1992–93.
Lecs, T R 11:15; lab, M or T or W 1:25–4:25. Staff.
A study of the principles of operation, adjustment, and maintenance of internal

combustion engines and tractors. Topics include engine cycles, fuels, lubricants, carburetion, fuel injection systems, ignition, charging circuits, valve reconditioning, engine testing, transmissions, traction, and human factors in tractor operation.]

ABEN 315 Electrotechnology
Spring. 3 credits. Prerequisite: PHYS 102 or equivalent.
Lecs, T R 10:10; lab, T or R 1:25-4:25.
D. C. Ludington.
A study of electrotechnology. Topics covered include: fundamentals of AC and DC circuits, power distribution, electrical safety, motors, lighting, control of electrical systems, batteries, solid-state electronics, digital logic, integrated circuits, and computer control. Laboratories offer hands-on experience.

ABEN 321 Soil and Water Management
Spring. 2 credits. S-U grades optional. Concurrent registration in SCAS 321 required.
Lecs, M W 9:05; disc-lab, M 1:25–4:25.
M. F. Walter, T. W. Scott.
An interdisciplinary course intended to introduce students to the general principles of soil and water interaction and to the effects of human intervention in these processes. Aspects of soil and water management, including hydrology, soil erosion, irrigation, drainage, and water quality are examined. Case studies from both the United States and the tropics are used to illustrate basic principles.

ABEN 331 Environmental Control for Agricultural Production Systems
Fall. 3 credits. S-U grades optional.
Lecs, M W F 11:15. K. G. Gebremedhin.
A study of environmental requirements, ventilation design, and control of agricultural production systems (dairy, swine, poultry, and fruit and vegetable storage facilities). Animal physiology and homeothermy, material handling, waste management, alternate energy sources on the farm, farmstead planning and layout, and engineering economic analysis of systems and alternatives.

ABEN 350 Transport Principles
Fall. 3 credits. Prerequisites or concurrent registration in MATH 294 and fluid mechanics.
Lecs, M W F 11:15. A. K. Datta.
Integration of heat and mass transfer combined with reaction kinetics in the context of agricultural and biological systems. Emphasis is on physical understanding of transport processes and simple reaction rates with application examples from plant and animal biology, the environment (soil/water/air), and food processing.

ABEN 367 Introduction to Biological Engineering
Spring. 3 credits. Prerequisites: one year each calculus and introductory biology; minimum one term each college chemistry and physics. Not open to freshmen. S-U grades optional.
Lecs, T R 10:10; lab, R 1:25–4:25.
J. B. Hunter.
Explores the use of engineering principles to solve biological problems in the context of laboratory experiments. Topics may include artificial organs, neuromuscular electrical signals, mass transfer in fermentation, enzyme kinetics, mechanics of plant or animal tissue, and DNA transfer. Many topics relate to ongoing research at Cornell. Appropriate for engineering and life science students. Field trips, demonstrations, and readings in current scientific literature.

ABEN 371 Hydrology and the Environment (also Soil, Crop, and Atmospheric Sciences 371, Civil and Environmental Engineering 334, and Geological Sciences 204)
Spring. 3 credits. Students enrolled in the statutory colleges must enroll in ABEN 371 or SCAS 371. Prerequisite: 1 course in calculus.
Lecs, T R 9:05; lab, F 1:25–3:20.
T. S. Steenhuis, J.-Y. Parlange,
M. F. Walter, P. C. Baveye,
W. H. Brutsaert, L. M. Cathles.
Introduction to hydrology as a description of the hydrologic cycle and the role of water and chemicals in the natural environment. Includes precipitation, infiltration, evapotranspiration, groundwater, surface runoff, river meandering floods, and droughts. Case studies, short field trips, computer programs, and laboratories are used to foster an understanding of concepts and principles of hydrologic processes.

ABEN 401 Career Development In Agricultural and Biological Engineering
Fall. 1 credit. Limited to seniors. S-U grades only.
Lec, T 12:20. G. E. Rehkugler.
A career development seminar for majors in the field of agricultural and biological engineering. Career opportunities in corporations, independent businesses, consulting, and public service. Professionalism, ethics, public policy and personal and corporate management issues are discussed.

ABEN 435 Principles of Aquaculture
Spring. 3 credits. Prerequisite: junior standing and above. S-U grades optional.
Lecs, T R 1:25–3. M. B. Timmons,
W. D. Youngs, C. A. Bisogni,
G. A. German, G. L. Rumsey,
P. R. Bowser, J. M. Regenstein, J. Meade, and G. H. Ketola.
An in-depth treatment of the principles of aquaculture: fish biology, waste treatment, engineering design, fish health, nutrition, processing, etc. This course is intended to build upon the undergraduate's previous course background and interests. A term project is required.

ABEN 450 Instrument Design: Signal Processing and Data Acquisition
Fall. 3 credits. Prerequisites: MATH 293 or equivalent, physics or electrical science, computer programming.
Lecs, M W (also F first 4 weeks) 12:20; lab to be arranged. D. J. Aneshansley.
An introduction to static and dynamic characteristics of instruments, electronic instruments, digital and analog signal conditioning circuits and techniques, data acquisition and instrument control with personal computers and micro-controllers, and computer data analysis. Biological and agricultural examples of instrument problems and designs are used. A final design project is required.

ABEN 451 Biomass Conversion Processes for Energy and Chemicals
Spring. 3 credits. Prerequisites: ABEN 250 and 350, MATH 294, Thermodynamics (co-registration permissible), and CHEM 211.
Lecs, M W F 9:05. L. P. Walker.
There are a variety of physical and biological processes available for converting plants and other biomass resources into fuels, industrial chemicals, and foods. The design of these processes is accomplished through fusing concepts from biochemistry, microbiology, and plant biology with the concepts and methods of engineering. There are five major components to this course: plants as biochemical resources, heat and mass transfer, enzyme catalysis, fermentation kinetics, and biological filtration with plants. The last four components are concluded with case studies that demonstrate how the scientific and engineering concepts are used to design a biomass conversion process.

[ABEN 461 Agromechanical Engineering: Machine Systems and Design
Fall. 3 credits. Prerequisites: ABEN 250 and mechanical design or equivalent. Offered alternate years. Not offered 1992–93.
Lecs, T R 10:10; lab, R 1:25–4:25. Staff.
Principles of design and analysis of agricultural machines to meet functional requirements. Emphasis is given to computer-aided analysis and design, selection of construction materials, and testing procedures. Engineering creativity, economic considerations, and safety are also stressed.]

[ABEN 462 Agromechanical Engineering: Power and Traction
Spring. 3 credits. Prerequisites: engineering dynamics, thermodynamics, and ABEN 250. Offered alternate years. Not offered 1992–93.
Lecs, T R 10:10; lab, R 1:25–4:25. Staff.
Synthesis of engineering sciences in the analysis, design, and testing of internal combustion engines and traction devices. Study areas include vehicle statics and dynamics, soil-machine interaction, electro-hydraulic control systems, human factors in vehicle design, and machine reliability. Computer analysis involves Runge-Kutta simulation, the finite element method, and digital data acquisition and processing. Students gain experience in modern laboratory and field testing.]

ABEN 466 Food Process Engineering: A Transport Phenomena Approach
Spring. 3 credits. Prerequisite: courses in either fluid mechanics and heat transfer or unit operations in food processing.
Lecs, T R 9:05; disc-lab, F 1:25–3:25.
A. K. Datta.
A unified transport phenomena based quantitative engineering approach to basic and advanced food processing concepts including sterilization, concentration, drying, freezing, separation, extrusion, etc. Considerable emphasis on microwave heating applications to these processes.

ABEN 467 Bioprocessing Applications in Agriculture
Fall. 4 credits. S-U grades optional. Prerequisites: BIOS 231, college biology and calculus, one year each; ABEN 250 or ENGR 219, or senior standing in life sciences. May not be taken for credit after CHEME 643.
Lecs, T R 10:10–12. J. B. Hunter.
An introduction to microbial and enzymatic process technology for engineers and life scientists. A substantial introduction to process engineering is illustrated by case studies of food and agricultural bioprocesses. Emphasis on engineering analysis and design. Suitable for both engineers and life scientists seeking careers in the biotechnology industry.

ABEN 471 Geohydrology (also Geology 445 and Civil and Environmental Engineering 431. Students enrolled in the statutory colleges must enroll in Agricultural and Biological Engineering 471.)
Fall. 3 credits. Prerequisites: MATH 294 and ENGR 202.
Lecs, M W F 10:10. T. S. Steenhuis, J.-Y. Parlange, A. L. Bloom, W. H. Brutsaert, L. M. Cathles.
An intermediate course in surface and groundwater flow and related design factors. Includes principles of fluid flow, the hydrologic cycle, natural channel dynamics and sediment transport, description and behavior of natural aquifers, groundwater hydraulics, soil water, and solute transport.

ABEN 475 Environmental Systems Analysis
Spring. 3 credits. Prerequisites: computer programming and one year of calculus.
Lecs, M W F 11:15. D. A. Haith.
Systems analysis and its use in environmental quality management. Emphasis is on mathematical modeling of environmental problems, translation of models into efficient computational algorithms, and use of computer simulation and optimization procedures (search techniques, linear programming, dynamic programming, and separable programming) to evaluate management alternatives. Applications include pollution control and resource management problems.

ABEN 477 Treatment and Disposal of Agricultural Wastes
Spring. 3 credits. Prerequisites: One environmental science course and at least junior-level standing; or permission of instructor.
Lecs, T R 2:30–3:45. W. J. Jewell.
Overview of pollution problems in agriculture, legal restrictions, and technologies used to control pollution. Biological, physical, and chemical processes are applied to solve problems associated with animal wastes, food production, and food and fiber processing.

ABEN 481 Design of Wood Structures
Spring. 3 credits. Prerequisite: ENG 202.
Lecs, M W F 10:10. K. G. Gebremedhin.
Computer-aided and design code manual procedures of engineering wood structures. Estimation of design loads, wood stress properties, design of columns, beams, trusses, rigid and post-frame buildings, shear walls, horizontal diaphragms, connections, and special wood (glue-laminated) structural systems.

ABEN 482 Bioenvironmental Engineering
Spring. 3 credits. Prerequisite: ABEN 250 and 350, or equivalent.
Lecs, T R 11:15–12:30. L. D. Albright.
Analysis and design of structures to modify the thermal and aerial environment of animals and plants. Environmental requirements of animals and plants, and the design of buildings to act as buffers between biological systems and climate. Heat flow, air flow, psychrometrics, energy balances, thermal biology, animal and plant models, thermal modeling, mechanical and natural ventilation, solar energy, and weather phenomena.

ABEN 491 Highway Engineering (also Civil and Environmental Engineering 642)
Spring. 3 credits. Prerequisites: junior standing in engineering, fluid mechanics, and soil mechanics (may be taken concurrently).
Lec, F 12:20–2:15; lab, M 1:25–4:25.
L. H. Irwin.
An introduction to highway engineering with an emphasis on design. Students will work in teams to apply the current standards and design criteria used in professional practice to several laboratory design projects. Topics of discussion include route location and design, traffic engineering, economic analysis, human factors and public safety, hydrology and drainage design, highway materials, pavement design, and maintenance.

ABEN 497 Special Topics in Agricultural and Biological Engineering
Fall and spring. 1–4 credits. S-U option. Prerequisite: written permission of instructor and adequate ability and training for the work proposed. Normally reserved for seniors in upper two-fifths of their class. Students must register with an independent study form (available in 140 Roberts Hall).
Staff.
Special work in any area of agricultural and biological engineering on problems under investigation by the department or of special interest to the student, provided, in the latter case, that adequate facilities can be obtained.

ABEN 498 Undergraduate Teaching
Fall and spring. 1–3 credits. Prerequisite: written permission of instructor. Students must register with an independent study form (available in 140 Roberts Hall).
Staff.
The student assists in teaching an agricultural and biological engineering course appropriate to his/her previous training. The student meets with a discussion or laboratory section, prepares course materials, grades assignments, and regularly discusses objectives and techniques with the faculty member in charge of the course.

ABEN 499 Undergraduate Research
Fall and spring. 1–3 credits. Prerequisites: normally reserved for seniors in upper two-fifths of their class. Adequate training for work proposed. Written permission of instructor. Students must register with an independent study form (available in 140 Roberts Hall).
Staff.
Research in any area of agricultural or biological engineering on problems under investigation by the department or of special interest to the student, provided that adequate facilities can be obtained. The student must review pertinent literature, prepare a project outline, carry out an approved plan, and submit a formal final report.

ABEN 501–502 M.P.S. Project
Fall and spring. 1–6 credits. Required of each M.P.S. candidate in the field.
Hours to be arranged. Staff.
A comprehensive project emphasizing the application of agricultural technology to the solution of a real problem.

ABEN 551–552 Agricultural and Biological Engineering Design Project
Fall and spring. 3–6 credits. Prerequisite: admission to the M.Eng.(Agr.) degree program.
Hours to be arranged. D. J. Aneshansley and staff.
Comprehensive design projects dealing with existing engineering problems in the field. Emphasis is on the formulation of alternative design proposals that include consideration of economics, nontechnical factors, engineering analysis, and complete design for the best design solution. Projects are supervised by faculty members on an individual basis. However, there is a formal orientation during the first four weeks of the semester. A formal report and public presentation of the results of the design project are required for completion of the course(s).

ABEN 652 Instrumentation: Sensors and Transducers
Spring. 3 credits. Prerequisites: Linear differential equations, introductory chemistry and introductory physics, or permission of the instructor.
Lecs, T R 12:20; lab to be arranged.
D. J. Aneshansley.
Application of instrumentation concepts and systems to the measurement of environmental, biological, and agricultural phenomena. Construction and characterization of electronic sensors and transducers will be emphasized. Image processing techniques will be introduced. A final project is required.

ABEN 655 Thermodynamics and Its Applications
Spring. 3 credits. Prerequisite: Mathematics 293 or equivalent.
Lecs, M W F 12:20. J.-Y. Parlange.
Thermodynamics and its applications to problems in engineering and agriculture. Topics include basic concepts (equilibrium, entropy, processes, systems, potentials, stability, phase transitions) and applications (soil and water processes, dilute solutions, electromagnetism, surface phenomena, heat and mass transport, structure of organizations).

[ABEN 665 Engineering Properties of Foods (also Food Science 665)
Spring. 2 credits. Prerequisite: course in transport processes or unit operations as applied to foods; or permission of instructor. Offered alternate years. Not offered 1992–93.
Lecs, T R 12:20. S. S. H. Rizvi, A. K. Datta, and S. J. Mulvaney.
Theories and methods of measurement and prediction of rheological, thermal, and mass transport properties of foods and biomaterial systems. Emphasis is on physical-mathematical basis of the measurement as well as the prediction processes. Examples of appropriate use of these properties in engineering design and analysis of food processes will also be provided.]

ABEN 671 Analysis of the Flow of Water and Chemicals in Soils
Fall. 3 credits. Prerequisites: two calculus courses and fluid mechanics.
Lecs, T R 3:35–4:50. J.-Y. Parlange, T. S. Steenhuis.
The course encompasses the full range from simple to complex methods to describe the chemical and water flows on the surface, in the vadose zone, and through the aquifer. Current analytical, semi-analytical, and computer-based techniques are discussed. Both homogeneous and heterogeneous soils are analyzed. Offered alternately with Civil and Environmental Engineering 633—a complementary, but not identical, course.

ABEN 672 Drainage
Spring. 4 credits. Prerequisites: ABEN 471 and two calculus courses. S-U grades optional. Offered alternate years.
Lecs, M W F 10:10; lab, T 1:25–4:25.
T. S. Steenhuis.
Theory of water and solute flow in aquifers, hillslopes, and the vadose zone as it relates to artificial drainage is discussed. Drainage design as it relates to agricultural land, landfills, and land application sites will be critically reviewed. The importance of preferential flow and matrix flow on water quality of drainage waters is examined. Laboratories are used for hands-on experience with measuring soil parameters and for actual drainage design.

[ABEN 673 Irrigation Systems
Spring. 3 credits. Prerequisite: permission of instructor. Offered alternate years. Not offered 1992–93.
Lecs, M W F 10:10. M. F. Walter.
An introduction with a systems perspective to the design and implementation of irrigation. Topics include systems planning and appraisal, irrigation structures, equipment, and measuring devices, water distribution, and scheduling. The course will include design for both domestic and Third World systems. Case studies will be used to help students develop a broad understanding of irrigation systems.]

ABEN 677 Treatment and Disposal of Agricultural Wastes
Spring. 3 credits. Prerequisite: permission of instructor.
3 lecs, hours to be arranged. W. J. Jewell.
Emphasis is on the causes of agricultural waste problems and the application of fundamentals of treatment and control methods to minimize related pollution. Fundamentals of biological, physical, and chemical pollution control methods are used in design problems with animal wastes, food production, and food and fiber processing.

ABEN 678 Nonpoint Source Models
Fall. 3 credits. Prerequisites: computer programming and calculus.
Lecs, M W F 11:15. D. A. Haith.
Development and programming of simulation models for management of water pollution from runoff and percolation. Emphasis is on prediction of water and chemical inputs to surface waters and groundwater. Applications include urban and rural runoff, lake eutrophication, groundwater waste loadings from land disposal sites, pesticides and nutrients in agricultural drainage, irrigation return flows, and watershed stream-flow and sediment yield.

ABEN 685 Biological Engineering Analysis
Spring. 4 credits. Prerequisite: T&AM 310 or permission of instructor.
Lecs, M W 1:25–3. J. R. Cooke.
Engineering problem-solving strategies and techniques are explored. Students solve several representative engineering problems that inherently involve biological properties. Emphasis is on formulation and solution of mathematical models and the interpretation of results. The student's knowledge of fundamental principles is used extensively.

ABEN 692 Pavement Engineering (also Civil and Environmental Engineering 643)
Fall. 4 credits. Limited to engineering seniors and graduate students. Prerequisite: one introductory course in soil mechanics or highway engineering.
Lecs, M F 12:20–2:15; lab, M 1:25–4:25.
L. H. Irwin.
Application of geotechnical engineering principles to the selection of materials and the design of highway and airfield pavements. Laboratory will provide experience with materials testing, asphalt concrete mix design, and chemical soil stabilization. Topics of discussion will include properties of asphalts and aggregates; bituminous mixture design; base courses; soil stabilization methods; seal-coat design; design of flexible and rigid pavements; design for frost conditions; and pavement evaluation using nondestructive test methods.

ABEN 700 General Seminar
Fall. No credit. S-U grades only.
M 12:20. Staff.
Presentation and discussion of research and special developments in agricultural and biological engineering and related fields.

ABEN 701 Special Topics in Agricultural and Biological Engineering
Fall or spring. 1–6 credits. Prerequisite: permission of instructor. S-U grades optional.
Hours to be arranged. Staff.
Topics are arranged by the staff at the beginning of the term.

ABEN 750 Orientation for Research
Fall. 1 credit. Limited to newly joining graduate students. S-U grades only.
Lecs, first 7 weeks, M 3:35; remainder to be arranged. M. F. Walter.
An introduction to departmental research policy, programs, methodology, resources, and degree candidates' responsibilities and opportunities.

ABEN 754 Sociotechnical Aspects of Irrigation (also Agricultural Economics 754, and Government 644)
Spring. 2–3 credits. S-U grades optional.
Hours to be arranged. M. Walter, R. Barker, N. Uphoff.
Examines irrigated agriculture and its relation to agricultural development. Emphasis on social processes within irrigation systems and interactions with social setting, including political and administrative aspects. Provides an opportunity to examine systematically the institutional and organizational policy issues associated with the design and operation of systems of irrigated agriculture in developing countries.

ABEN 761 Power and Machinery Seminar
Spring. 1 credit. Limited to graduate students. Prerequisite: permission of instructor. S-U grades only.
Hours to be arranged. Staff.
Study and discussions of research and new developments in agricultural power and machinery.

ABEN 771 Soil and Water Engineering Seminar
Fall and spring. 1–3 credits. Prerequisite: graduate status or permission of instructor. S-U grades optional.
Hours to be arranged. T. S. Steenhuis, M. F. Walter, J.-Y. Parlange.
Study and discussion of research or design procedures related to selected topics in irrigation, drainage, erosion control, hydrology, and water quality.

ABEN 775 Agricultural Waste Management Seminar
Spring. 1 credit. Prerequisite: permission of instructor. S-U grades only.
Hours to be arranged. Staff.
Management of agricultural wastes, with emphasis on physical, chemical, biological, and economic factors affecting waste production, treatment and handling, utilization, and disposal.

ABEN 781 Structures and Related Topics Seminar
Spring. 1 credit. Prerequisite: graduate status or permission of instructor. S-U grades only.
Disc to be arranged. K. G. Gebremedhin.
Advanced analysis and design of production systems with emphasis on structural and environmental req uirements, biological responses, and economic considerations.

ABEN 785 Biological Engineering Seminar
Spring. 1 credit. Prerequisite: graduate status or permission of instructor. S-U grades only.
Disc to be arranged. J. R. Cooke.
The interactions of engineering and biology, especially the environmental aspects of plant, animal, and human physiology, are examined in order to improve communication between engineers and biologists.

AGRICULTURAL ECONOMICS

W. G. Tomek, chair; D. J. Allee, B. L. Anderson, R. D. Aplin, R. Barker, N. L. Bills, R. N. Boisvert, J. Brake, K. Bryant, D. L. Call, G. L. Casler, L. D. Chapman, R. D. Christy, G. J. Conneman, J. Conrad, H. de Gorter, E. E. Figueroa, O. D. Forker, G. A. German, D. A. Grossman, R. Herdt, M. Hubbert, M. Hudson, H. M. Kaiser, R. J. Kalter, W. A. Knoblauch, S. C. Kyle, E. L. LaDue, D. Lee, W. H. Lesser, E. W. McLaughlin, R. A. Milligan, T. D. Mount, A. M. Novakovic, T. T. Poleman, J. Pratt, C. Ranney, D. G. Sisler, D. Streeter, L. Tauer, E. Thorbecke, C. van Es, G. B. White, L. S. Willett, K. Wing

Courses by Subject

Farm management, finance, and production economics: 302, 402, 404, 405, 406, 407, 408, 409, 605, 608, 708

Statistics, quantitative methods, and price analysis: 310, 410, 411, 412, 413, 415, 419, 710, 711, 712, 713, 717

Business management, law, and accounting: 220, 221, 320, 321, 322, 323, 324, 325, 422, 424, 425, 426, 427, 428

Public policy: 332, 430, 431, 630, 730, 731

Marketing and food distribution: 240, 340, 342, 346, 347, 443, 447, 448, 449, 640, 641, 740, 741

Resource economics: 252, 450, 652, 750, 751, 754

Economics of development: 464, 660, 664, 665, 763

General, contemporary issues, research, and other: 100, 380, 492, 497, 498, 499, 699, 700

AG EC 100 Introduction to Global Economic Issues
Fall. 3 credits.
Lecs, M W F 11:15. 2 evening prelims.
D. Sisler.
The economics and geography of world agriculture, providing a basis for understanding past development and future changes. Elementary economic principles, historical development, physical geography, and population growth are studied in their relation to agricultural development and the economic problems of farmers. Where possible, current domestic and foreign agricultural issues are used to illustrate principles.

AG EC 220 Introduction to Business Management
Spring. 3 credits.
Lecs, M W F 10:10 or 11:15; disc, M 2:30–4:25 or 7:30–9:25 p.m. (3 secs); T 8–9:55, or 2:30–4:25; W 8–9:55, 10:10–12:05, 12:20–2:15, 2:30–4:25, 7:30–9:25 p.m. (3 secs); R 8–9:55 or 2:30–4:25. In weeks when discs are held, there will be no W lecture. 2 evening prelims.
R. D. Aplin.
Principles and tools useful in performing four major functions of management: planning, organizing, directing and leading, and controlling. Within this framework, consideration is given to the firm's internal and external environments; forms of business ownership; financial statements; cost behavior; and a few key concepts and tools in financial management and marketing. Several guest executives.

AG EC 221 Financial Accounting
Spring. 3 credits. Not open to freshmen.
Lecs, M F 11:15 or 12:20; lab, T 10:10–12:05 (2 secs), 12:20–2:15, or 2:30–4:25; W 10:10–12:05 (2 secs), 12:20–2:15 "(2 secs), 2:30–4:25 (2 secs), or 7–9 p.m. (3 secs); R 10:10–12:05, 12:20–2:15, or 2:30–4:25. 2 evening prelims and a comprehensive final. M. Hubbert.
A comprehensive introduction to financial accounting concepts and techniques, intended to provide a basic understanding of the accounting cycle, elements of financial statements, and statements interpretation. Elements examined include inventory, depreciation, internal control of assets, time value of money, notes, stocks, bonds, and the statement of cash flows. Limited use of a financial data base of publicly held companies.

AG EC 240 Marketing
Fall. 3 credits.
Lecs, M W F 10:10; lab, M 2:30–4:25, T 12:20–2:15 or 2:30–4:25 (2 secs), W 2:30–4:25 (2 secs), R 12:20–2:15 (2 secs) or 2:30–4:25 (2 secs), or F 10:10–12:05. In weeks labs are held, there will be no F lecture. E. W. McLaughlin.
This course provides a broad introduction to the fundamentals of marketing. We will explore the components of an organization's strategic marketing program, including how to plan, price, promote, and distribute goods, services, ideas, people, and places. We will examine specifically the central role played by changing consumers and place our primary emphasis on consumer goods industries. Although examples will frequently be drawn from the food and agricultural system, the principles and concepts from this course will apply equally well to the marketing of goods and services in all sectors of the economy. Case studies, industry guest lectures, and current marketing applications from various companies will be presented and analyzed.

AG EC 252 Natural Resource and Environmental Economics
Spring. 3 credits. Prerequisite: ECON 101 or equivalent.
Lecs, T R 2:30–4:00. C. Ranney.
An introduction to the concepts and methods of analysis in the public and private use of resources, particularly benefit-cost analysis and discounting. Major current problems in global warming, agriculture, forestry, acid rain, energy use, and world petroleum resources. The growing world trade in resource-intensive manufactured products and the impact on income, employment, and pollution. Comparative resource use and environmental protection in industrialized and developing countries.

AG EC 302 Farm Business Management
Fall. 4 credits. Not open to freshmen. This course is a prerequisite for AGEC 402 and 405.
Lecs, M W F 9:05; lab, W or R 1:25–4:25. On days farms are visited, the lab period is 1:25–5:30. W. A. Knoblauch.
An intensive study of planning, organizing, operating, and managing a farm business, with emphasis on the tools of managerial analysis and decision making. Topics include financial statements, business analysis, budgeting, and acquisition, organization, and management of capital, labor, land, and machinery.

AG EC 310 Introductory Statistics
Fall, spring, or summer. 4 credits. Prerequisite: EDUC 115 or equivalent level of algebra.
Lecs, M W F 1:25; lab T 9:05–11 or 2:30–4:25 (2 labs); W 11:15–1:10 or 2:30–4:25 (2 labs); or R 9:05–11, 12:20–2:15, or 2:30–4:25 (2 labs).
3 evening exams. C. van Es.
An introduction to statistical methods. Topics to be covered include the descriptive analysis of data, probability concepts and distributions, estimation and hypothesis testing, regression, and correlation analysis. Applications from business, economics, and the biological sciences are used to illustrate the methods covered in the course.

AG EC 320 Business Law I
Fall. 3 credits. Limited to juniors, seniors, and graduate students.
Lecs, M W F 9:05. 1 evening prelim.
D. A. Grossman.
Consideration is given chiefly to legal problems of particular interest to persons who expect to engage in business. Emphasis is on the law pertaining to personal property, contracts, agency, real property, and the landlord-tenant relationship.

AG EC 321 Business Law II
Spring. 3 credits. Limited to juniors, seniors, and graduate students. Prerequisite: a course in business law.
Lec, T R 8:30–9:55. 1 evening prelim.
D. A. Grossman.
The first portion of this course examines legal issues in the formation and operation of business enterprises, particularly partnerships and corporations. The second portion of the course will review government regulations and control of business organizations. Topics may include employment discrimination, securities regulation, environmental law, product liability, bankruptcy, and commercial paper.

[AG EC 322 Taxation in Business and Personal Decision Making
Spring. 3 credits. Recommended: background in accounting and business law. Not offered 1992–93.
Lecs, M W 2:30; disc, W 3:35 or R 10:10.
D. A. Grossman.
The impact of taxation on business and personal decision making. After a brief discussion of tax policy, an in-depth examination is conducted of federal income, estate and gift taxes affecting individuals and business entities. Both tax management and tax reporting are stressed.]

AG EC 323 Managerial Accounting
Fall. 3 credits. Prerequisite: AG EC 221 or equivalent.
Lecs, M W 12:20; disc, R 10:10–12:05, 12:20–2:15 (2 secs), or 2:30–4:25 (2 secs); or F 12:20–2:15 (2 secs), or 1:25–3:20. 2 evening prelims, a third exam, and a project on an electronic spreadsheet.
M. Hubbert.
An introduction to cost accounting that emphasizes the application of accounting concepts to managerial control and decision making. Major topics include product costing, standard costing, cost behavior, cost allocation, budgeting, inventory control, variance analysis, measuring divisional performance, and accounting systems in the manufacturing environment. Limited use of Lotus on the IBM PC.

AG EC 324 Financial Management
Spring. 4 credits. Prerequisite: AG EC 120 or equivalent. Recommended: AG EC 221 and 310 or equivalents.
Lecs, M W F 9:05; disc, W 2:30–4:25 or R 9:05–11, 12:20–2:15, or 2:30–4:25, or F 10:10–12:05 or 12:20–2:15. 2 evening prelims. B. L. Anderson.
Focuses on three major questions facing management: how to evaluate capital investment decisions, how to raise the capital to finance the firm, and how to generate sufficient cash flows to meet the firm's cash obligations. Major topics include methods to analyze capital decisions, impact of taxes, techniques for handling risk and uncertainty, effects of inflation, sources and costs of debt and equity, capital structure, leverage, and working capital management. Microcomputers are used for analyzing financial problems. Previous computer experience is preferred, but optional instruction offered.

AG EC 325 Personal Enterprise and Small Business Management
Spring. 3 credits. Limited to juniors and seniors. Prerequisites: AG EC 120 and 221 or permission of instructor. Absolutely no adds or drops after first class meeting.
Lec, M W 1:25; Disc, R 10:10–12:05 or 2:30–4:25, or F 10:10–12:05 or 2:30–4:25.
M. Hudson.
Designed to acquaint students with the changing role of small businesses in the global economy. Special emphasis on the problems of planning and starting a new business, including strategic planning, financing, marketing, and managing growth. The major term project, development of a business plan, is done in groups assigned within sections. Case studies and visiting entrepreneurs illustrate a variety of small business issues.

[AG EC 332 Economics of the Public Sector
Spring. 3 credits. Limited to 150 juniors and seniors. Prerequisite: ECON 101 or equivalent.
Lecs, T R 12:20–2:15. N. Bills. Will not be offered 1992–93.
The application of economic concepts to evaluation of the structure and performance of the public sectors of the economy. Emphasis on microeconomic analysis of public finance and public resource allocation. Principal topics: market failure, articulation of public choice and interests, evaluation of public decisions, and current public policy.]

AG EC 340 Futures and Options Trading
Spring. 3 credits. Prerequisites: ECON 101, AG EC 240, and permission of instructor. S-U grades optional.
Lec, T R 10:10–11:25. D. Streeter.
The focus of the course is on the use of agricultural financial futures and options as marketing and management tools. A primary objective is to understand how companies, financial institutions, and farm businesses can employ hedging strategies to manage risk. Students will participate in a simulated trading exercise in which they will use real-time price and market information and input from industry experts to manage a hedge position.

AG EC 342 Marketing Management
Spring. 3 credits. Prerequisites: AG EC 240 and ECON 101–102.
Lecs, M W F 10:10; disc, R 12:20–1:50 or 2:30–4 (3 secs), F 10:10–11:40 (2 secs), or 12:20–1:50 (2 secs). In weeks discs are held, there is no F lecture. R. D. Christy.
Deals with the central link between marketing at the societal level and everyday consumption by the general public. As such, this course emphasizes the management aspects of marketing by considering consumer behavior, strategies in product and brand selection, pricing, promotion, sales forecasting, and channel selection. Identification and generation of economic data necessary for marketing decisions are considered. Public policy and ethical dimensions of marketing are examined.

AG EC 346 Dairy Markets and Policy
Fall. 3 credits. Limited to juniors and seniors. Prerequisite: ECON 101 or equivalent.
Lecs, T R 8:30–9:55. J. E. Lenz.
A survey of the structural and institutional characteristics of dairy markets and the analysis of policy issues, pricing systems, and government programs, including marketing orders, price supports, and import policies.

AG EC 347 Marketing Fruits, Vegetables, and Ornamental Products
Fall. 3 credits. S-U grades optional. Estimated cost of field trip, $50.
Lec M W F 12:20. A two-day field trip. E. E. Figueroa.
A study of fruits, vegetables, and ornamental product marketing, including seasonal variations. Role of market intermediaries, role of government agencies, and the price discovery process. Discussion and description of horticultural product market orders in the U. S. The emerging importance of interregional and international markets.

AG EC 380 Independent Honors Research in Social Science
Fall or spring. 1–6 credits. Limited to students who have met the requirements for the honors program. See "Honors Program" in CALS section of this catalog. Provides qualified students an opportunity to conduct original research under supervision.

AG EC 402 Advanced Farm Business Management
Spring. 3 credits. Prerequisite: AG EC 302 or equivalent.
Lecs, M W 10:10; disc, W 1:25–3:20. G. L. Casler.
Emphasis is on evaluating the profitability of alternative investments and enterprises. Principal topics include strategic planning, the effects of income taxes on investment decisions, capital investment analysis, linear programming, forms of business organization, and financial risk and uncertainty. Experience in computer applications to farm business management is provided. Previous computer experience is not required.

AG EC 404 Advanced Agricultural Finance Seminar
Spring. 2 credits. Limited to 16 seniors with extensive course work in farm management and farm finance. Open by application prior to March 1 of the year before the course is offered.
W 3:35–5:30. E. L. LaDue.
A special program in agricultural finance, conducted with financial support from the Farm Credit System. Includes two days at Farm Credit Banks of Springfield, one week in Farm Credit Association offices, an all-day field trip observing FHA financing during fall term, a four-day trip to financial institutions in New York City during intersession, and lecture-discussions in the spring term. Representatives from banking, agribusiness, finance, and similar areas participate in spring-term lecture-discussion sessions.

AG EC 405 Farm Finance
Spring. 4 credits. Prerequisite: AG EC 302 or equivalent.
Lecs, M W F 9:05; disc, T 1:25–3:20. E. L. LaDue.
The principles and practices used in financing farm businesses, from the perspectives of the farmer and the farm lender. Topics include sources of capital, financing entry into agriculture, financial analysis of a business, capital management, financial statements, credit instruments, loan analysis, financial risk, and leasing.

AG EC 406 Farm and Rural Real Estate Appraisal
Spring, weeks 7–15. 2 credits. Limited to 40 students. Prerequisites: AG EC 302 or equivalent and permission of instructor.
Lec, R 11:15; lab, R 1:25–5:30. 6 half-day field trips, 1 all-day field trip. G. J. Conneman.
The basic concepts and principles involved in appraisal. Factors governing the price of farms and rural real estate and methods of valuation are studied. Practice in appraising farms and other rural properties.

AG EC 407 Financial Management in Farming
Fall. 2 credits. Limited to ALS majors. Prerequisite: AG EC 405.
Lecs, M W 1:25. J. R. Brake.
Financial markets and policies affecting agriculture and farmers. How money and capital markets affect credit cost and availability in agriculture. Insurance concepts for farmers. Financial considerations in starting to farm. Issues in choice of farm organizational structure. Present value concepts.

AG EC 408 Seminar in Farm Business Decision Making
Fall (1 week in intersession). 1 credit. Prerequisites: AG EC 302 and 405 or equivalent, and permission of instructor.
M T W R F 8–5. G. J. Conneman.
Develops method of analyzing farm business management problems. Gives student experience in identifying alternatives in problem solving. Provides opportunities to analyze and evaluate actual farm situations. Two field trips and intensive work with a farm family.

AG EC 409 Farm Management Workshop
Fall. 1 credit. Limited to seniors and graduate students.
T 12:20-2. W. A. Knoblauch and staff.
Presentation of current topics in farm management and production economics. Participants take part in seminars where research, teaching, and extension program methodology and results are presented by faculty and graduate students. Students prepare a summary and evaluation of a recent research publication.

AG EC 410 Business Statistics
Spring. 3 credits. Prerequisite: AG EC 310 or equivalent.
Lecs, M W F 10:10. C. van Es.
This course focuses on five major topics used to analyze data from marketing research, business, and economics. Topics studied are: survey sampling procedures, nonparametric methods, index numbers, time series and forecasting, and experimental design and ANOVA. The course will involve a research project designed to give experience in collecting and interpreting data.

AG EC 411 Introduction to Econometrics
Spring. 3 credits. Limited to juniors, seniors, graduate students. Prerequisite: AG EC 310 or equivalent.
Lecs, T R 10:10–11:25. J. Pratt.
The course introduces students to basic econometric principles and the use of statistical procedures in empirical studies of economic models. Assumptions, properties, and problems encountered in the use of multiple regression procedures are discussed, and simultaneous equation models are introduced. Students are required to specify, estimate, and report the results of an empirical model.

AG EC 412 Introduction to Mathematical Programming
Fall. 3 credits. Primarily for juniors, seniors, and M.S. degree candidates. Prerequisite: AG EC 310 or equivalent.
Lecs, M W 9:05; lab, W 2:30–4:25. H. M. Kaiser.
This is primarily a course in applied linear programming, but some basic nonlinear programming techniques will be covered. The links between theoretical and empirical models are stressed in this course. Emphasis will be placed on model building, estimation, and interpretation of results. Some topics include applied linear, quadratic, and integer programming to common decision-making problems.

AG EC 413 Information Systems and Decision Analysis
Fall. 3 credits. Limited to 60 juniors and seniors. Prerequisites: ABEM 102 or equivalent, ECON 101 or equivalent, and AG EC 310.

Lecs, M W 10:10; labs arranged. 2 evening prelims. D. Streeter.

The focus of the course is on management decision making and the support provided by various components of an information system. The computer models presented support various stages of decision-making: the information seeking stage (e.g., forecasting models), the selection stage (e.g., decision analysis and analytic hierarchy process models), and the implementation stage (e.g. project management models). Students are encouraged to develop their critical thinking about the output from quantitative models and sensitivity analysis is emphasized. Both the promise and the limitations of information technologies are discussed.

AG EC 415 Price Analysis
Fall. 3 credits. Prerequisite: ECON 101–102 or equivalent.

Lecs, M W F 11:15. L. S. Willett.

The focus of this course is on the analysis of supply and demand characteristics of commodities with particular attention to agricultural products. Institutional aspects of pricing, temporal and spatial price relationships, price forecasting, and the economic consequences of pricing decisions are included.

AG EC 419 Expert Systems Workshop
Fall. 3 credits. Prerequisite: one computer use or programming course.

Lec, T 2:30–4:25; disc, hours to be arranged. R. J. Kalter.

A hands-on introduction to the use of expert systems by business managers. Topics include the concepts behind knowlege-based applications, domain selection, knowledge engineering, representation, and processing, reasoning mechanisms, rule and object dynamics, and the integration of expert systems with quantitative models and computer databases. Students will work in groups to design, implement, and test an expert system relevant to a contemporary business problem. Interested students need not be proficient in computer programming to take this course.

AG EC 422 Estate Planning
Fall. 1 credit. Limited to upperclass students. S-U grades only.

Lec, M 3:35. D. A. Grossman.

Fourteen sessions on the various aspects of estate-planning techniques. The law and use of trusts, the law of wills, federal and New York State estate and gift taxes, and probate procedures are covered.

AG EC 424 Business Policy
Fall. 3 credits. Limited to seniors majoring in business management and marketing.

T R 9:05–10:35, 11:05–12:35, or 2:30–4. R. D. Aplin.

An integrating course that examines business policy formulation and implementation from the standpoint of the general manager of an organization, focusing on decision making and leadership. The course is built around a series of cases. Several guest executives. Emphasizes improving oral and written communication skills.

AG EC 425 Small Business Counseling
Fall. 4 credits. Limited to seniors. Prerequisite: AG EC 325 or NBA 300.

Lec, M 2:30–4:25; disc, 3 hours per week, arranged. M. Hudson.

Allows students to serve as consultants to small businesses in the central New York area and confront problems facing small personal enterprises. Encourages the application of basic business courses to actual business and the witnessing of the results of firm-level decision making. Student teams meet with the course staff at prearranged times during the semester.

AG EC 426 Cooperative Management and Strategies
Spring. 3 credits. Recommended: AG EC 120 or equivalent. Estimated cost of field trip, $50.

Lecs, M W F 12:20. 2-day field trip required. B. L. Anderson.

Investigates the unique aspects of cooperative businesses and not-for-profit membership organizations. Topics are approached from the points of view of management, the board of directors, and members and include cooperative principles, legislation, taxation, as well as cooperative management, financial and marketing strategies. Primary focus is on operating cooperatives in agriculture and the management and strategic alternatives they face.

AG EC 427 Advanced Personal Enterprise Seminar
Spring. 3 credits. Limited to 18 seniors. Prerequisites: AG EC 325 and 425. Open by application only.

Lecs, M W 2:30–4:25. M. Hudson.

Designed for seniors with a demonstrated interest in starting or managing their own business. A discussion format is used to address current topics that will affect the success of business ventures. Students lead discussions, make presentations and study a business or specific issue and prepare a major project documenting the results of their inquiry. Visits by current enterprise leaders will be an important aspect of the course.

AG EC 428 Technology: Management and Economic Issues
Spring. 3 credits. Prerequisites: ECON 101–102, or permission of instructor.

Lecs, T R 10:10–11:25. R. J. Kalter.

Designed to acquaint students with the role of technology in modern society, business, and education. Emphasis is placed on the context for managerial analysis and decisions with respect to technological adoption. Topics include the historical influence of technology on economic structure and activity, contemporary technological trends, implications for business managers, adoption and diffusion, public acceptance, implications for future structural and spatial organization of economic activity, impediments to technological advancement, and public policy considerations.

AG EC 430 International Trade Policy
Spring. 3 credits. Prerequisites: ECON 101–102 or equivalents.

Lecs, T R 12:20–1:35. D. R. Lee.

This course examines the economic principles underlying international trade and the policies, practices, and institutions that influence trade. Applications to international trade in primary commodities and to both developed and developing countries are emphasized.

AG EC 431 Food and Agricultural Policies
Fall. 3 credits.

Lecs, T R 9:05; disc, R 11:15 or 1:25. H. deGorter.

The course deals broadly with food and agricultural policies, including price support and storage or reserve policies, agricultural protection, soil conservation programs, the structure of agriculture, domestic food subsidy programs, environmental issues, and food safety. The importance of international trade and agricultural policies in other countries is emphasized.

AG EC 443 Food-Industry Management
Fall. 4 credits. Limited to juniors and seniors. Prerequisite: AG EC 448 or 342 or permission of instructor.

Lecs, T R 9:05–10:35; sec, T 2–3:30. G. A. German.

A case-study approach is used to examine the application of management principles and concepts to marketing and distribution problems of the food industry. Cases covering new product introductions, merchandising strategies, and investment decisions are included. Guest speakers from the food industry present case-study solutions at the Tuesday session.

AG EC 447 Food Marketing Colloquium
Fall and spring. 2 credits. Limited to 10–12 seniors with extensive course work in food industry management and marketing. Open by application prior to March 1 of the preceding academic year. S–U grades only. Cost of field trips for year about $400.

R 3:35–5. G. A. German and E. W. McLaughlin.

This two-semester special seminar will provide the weekly focus for the Food Marketing Fellows Program. The seminar will cover advanced topics in food marketing, many of which will have an important international dimension and will be presented by industry members. A number of field trips will be taken, including an eight-day international trip during January intersession and a five-day trip to the Food Marketing Institute Convention in Chicago during the first week in May. Students will prepare research topics on various aspects of the food industry.

AG EC 448 Food Merchandising
Spring. 3 credits. Limited to juniors and seniors. Prerequisite: AG EC 240.

Lecs, T R 10:10–11:25. G. A. German.

Merchandising principles and practices as they apply to food industry situations. The various elements of merchandising are examined, including buying, pricing, advertising, promotion, display, store layout, profit planning and control, and merchandising strategy. The consequences of food industry trends and initiatives for other industry members, public policymakers, and consumers are considered.

AG EC 449 Global Marketing Strategy
Fall. 2 credits. Prerequisite: AG EC 342 or permission of instructor. Cost of field trip, about $100.

W 2:30–4. One 2-day field trip to the New York City area during early November. E. W. McLaughlin.

This course will examine the marketing environment, opportunities, and challenges in the rapidly changing global marketplace. We will explore what factors are predictive of business success in various national markets and the means by which these factors can be incorporated into firm strategy. The focus of the course will be kept practical and managerial through liberal use of actual case studies, industry guests, and a field trip.

AG EC 450 Resource Economics
Fall. 3 credits. Prerequisites: MATH 111 and ECON 313.

Lecs, M W F 2:30–3:20. J. M. Conrad.
Dynamic models of renewable, nonrenewable, and environmental resources will be constructed to examine market allocation and optimal resource management.

AG EC 464 Economics of Agricultural Development
Spring. 3 credits. Prerequisites: ECON 101–102, or permission of instructor.
Lecs, T R 8:40–9:55. S. Kyle.
This course is designed to provide an understanding of the economics of the agricultural sector in low-income countries. In addition, more general issues of economic development beyond the agricultural sector will be covered in order to provide the necessary context for an understanding of rural problems. Among the areas covered are the nature of development and technical change, welfare and income distribution, land reform, food and nutrition policy, food security and food aid, competition with more developed countries and international markets, the effect of U.S. policy on agricultural development, and the role of international institutions. Examples from a wide variety of developing countries will be used to illustrate the basis for economic analysis.

[AG EC 492 Contemporary Issues Seminar: Development in Southern Africa
Spring. 2 credits. Limited to 25 juniors and seniors. Not offered 1992–93.
Hours to be arranged. D. Chapman.
A contemporary issues seminar about economic and social issues in the development of Southern Africa. Natural resources as the basis for trade and manufacturing. Potential for agriculture. Education, health, and public sector development. Economic integration and political conflict. Apartheid as a regional problem. Opportunities and obstacles to regional development. Summer field trip for additional credit is possible.]

AG EC 497 Special Topics
Fall or spring. Variable credit. Students must register with an Independent Study form (available in 140 Roberts Hall).
Hours to be arranged. Staff.
To be used for special projects designed by faculty members to supplement existing classes or as the first semester of a new or experimental course.

AG EC 498 Supervised Teaching Experience
Fall or spring. 1–3 credits. Total of 4 credits maximum during undergraduate program. Students must register with an Independent Study form (available in 140 Roberts Hall).
Hours to be arranged. Staff.
Designed to give qualified undergraduates experience through actual involvement in planning and teaching courses under the supervision of department faculty. Students are expected to actually teach at least one hour per week for each credit awarded. Students cannot receive both pay and credit for the same hours of preparation and teaching.

AG EC 499 Undergraduate Research
Fall, spring, or summer. 1–4 credits. Limited to students with grade-point averages of at least 2.7. Prerequisite: written permission of the staff member who will supervise the work and assign the grade. Students must register with an Independent Study form (available in 140 Roberts Hall). S-U grades optional.
Permits outstanding undergraduates to carry out independent study of suitable problems under appropriate supervision. Students cannot receive both pay and credit for the same hours of work.

AG EC 605 Agricultural Finance and Capital Management
Fall. 3 credits. Prerequisite: AG EC 402 or 405, or equivalent. Offered alternate years. $25 charge for reading materials; no text.
T R 8:40–9:55. J. Brake, L. Tauer, E. LaDue.
Advanced topics in capital management and financing of agriculture. Special emphasis on current issues. Example topics: farm-sector funds flows, financial risk and decision analysis, agricultural finance policy, financial intermediation and intermediaries, firm growth, inflation loan evaluation, and selected topics on financing agriculture in developing countries.

AG EC 608 Production Economics
Fall. 3 credits. Recommended: ECON 313 and MATH 111 or equivalents.
Lecs, M W F 10:10. L. W. Tauer.
The theory of production economics with emphasis on applications to agriculture. Topics include the derivation, estimation, and use of production, cost, profit, demand, and supply functions. Production response over time and under risk is introduced.

AG EC 630 Policy Analysis I: Welfare Theory, Agriculture, and Trade
Spring. 4 credits. Prerequisites: AG EC 608 or CE&H 603, ECON 313, or equivalent intermediate micro theory incorporating calculus.
Lecs T R 8–9:55. C. Ranney and H. deGorter.
The first half of the course surveys the theory of welfare economics as a foundation for public policy analysis. Major issues addressed include the problem of social welfare measurement, the choice of welfare criteria, and the choice of market or nonmarket allocation. Basic concepts covered include measurement of welfare change, including the compensation principle, consumer and producer surplus, willingness-to-pay measures, externalities, and the general theory of second-best optima. The second half of the course focuses on public policy analysis as applied to domestic agricultural policy and international trade. The domestic policy component examines major U.S. farm commodity programs and related food and macroeconomic policies and analyzes their effects on producers, consumers, and other groups. The international trade component examines the structure of world agricultural trade, analytical concepts of trade policy analysis, and the principal trade policies employed by countries in international markets.

AG EC 640 Analysis of Agricultural Markets
Fall, weeks 1–7. 2 credits. Prerequisites: AG EC 415 and 411 or equivalents.
Lecs, T R 12:20–2:15. L. S. Willett.
This course is about markets for agricultural products. Focus is placed on identifying their distinguishing characteristics, establishing criteria for evaluating performance, analyzing models for price determination and farm-retail marketing margins, and evaluating selected public-policy issues related to market performance.

AG EC 641 Commodity Futures Markets
Fall, weeks 8–14. 2 credits. Prerequisites: AG EC 411 and 415 or equivalents. Recommended: AG EC 640.
Lecs, T R 12:20–2:15. W. G. Tomek.
This course is primarily about markets for agricultural futures contracts. Emphasis is placed on price behavior on cash and futures markets and the relationships among prices. These principles provide a foundation for a discussion of hedging, speculation, and public-policy issues.

AG EC 652 Land Economics Problems
Fall or spring. 1 or more credits. Limited to graduate students. Prerequisite: permission of instructor. S-U grades optional.
Hours to be arranged. D. J. Allee.
Special work on any subject in the field of land economics.

AG EC 660 The World's Food
Spring. 3 credits. S-U grades optional.
T R 12:20–1:40. T. T. Poleman.
Designed to introduce first-year graduate students to the world food situation and the interrelated problems of food, population, and employment in developing countries. Food economics, the extent, causes, and cures of hunger, and the outlook for feeding an eventual global population of 10 to 12 billion are emphasized. Employment is seen as the key variable influencing both population growth and effective demand for food.

AG EC 664 Microeconomic Issues in Agricultural Development
Spring. 3 credits. Prerequisite: AG EC 608, ECON 311, or permission of instructor. S-U grades optional.
T R 4:30–5:55. R. Barker.
Issues such as production efficiency, induced technological change, allocation of research resources, and the distribution of benefits from new technology are discussed. Attention is also given to the evolution of paradigms of environmental management and development. The theoretical argument is related to applied research problems.

AG EC 665 Food and Nutrition Policy (also Nutritional Sciences 685)
Fall. 3 credits. Prerequisites: CE&H 310 or 603 or ECON 311 or 313 or AG EC 415 or equivalent. Knowledge of multiple regression. S-U grades optional.
Lecs, M W 1:15–2:25. Staff.
The course will identify the principal links between human nutrition and government action, with emphasis on developing countries. The process of policy formation, including economic and political factors, will be discussed. The role of nutrition information and surveillance in policy design, implementation, and evaluation will be analyzed along with methodologies for empirical analysis of food and nutrition policy.

AG EC 699 M.P.S. Research
1–6 credits. Prerequisite: registration as an M.P.S. student. Credit is granted for the M.P.S. project report.

AG EC 700 Topics in Agricultural Economics
Fall or spring. Limited to graduate students. Credit, class hours, and other details arranged with a faculty member.
This course is used to offer special topics in agricultural economics that are not covered in regular class offerings. More than one topic may be given each semester in different sections. The student must register in the

section appropriate to the topic being covered; the section number is provided by the instructor.

AG EC 708 Advanced Production Economics
Fall. 3 credits. Prerequisite: AG EC 608, 710, or equivalents; ECON 509 is highly recommended. Offered alternate years.
Hours to be arranged. R. N. Boisvert.
Theoretical and mathematical developments in production economics, with emphasis on estimating micro- and macro-production relationships, scale economies, technical change, factor substitution. Recent developments in flexible functional forms, duality and dynamic adjustment models are emphasized. Discussions of several other selected topics such as risk, supply response, and household production functions change from year to year based on student interest.

AG EC 710 Econometrics I
Spring. 4 credits. Prerequisite: matrix algebra and statistics (e.g., STATS 417 and 601) sufficient to use G. Judge, et al., *Introduction to the Theory and Practice of Econometrics*, 2d edition, chapters 5ff.
Lecs, T R 2:30–4:25. W. G. Tomek.
This course provides an intermediate-level treatment of linear statistical models used in econometrics, including distributed lag specifications, disturbance-related sets of equations, and simultaneous linear models. Common problems such as collinearity, specification error, and autocorrelated disturbances are covered. Students seeking an introduction to econometrics should take Agricultural Economics 411.

AG EC 711 Econometrics II
Fall. 4 credits. Prerequisite: AG EC 710 or equivalent. STATS 417 recommended.
Lecs, T R 10:10–12:05. T. D. Mount.
Coverage beyond that of Agricultural Economics 710 of linear regression models, including alternative methods of incorporating non-sample information and testing restrictions, diagnostic techniques for collinearity and influential observations, pooling data, stochastic coefficients, limited dependent variables and latent variables.

AG EC 712 Quantitative Methods I
Fall. 4 credits. Prerequisite: some formal training in matrix algebra. A course at the level of STATS 417 is highly recommended.
Lecs, M W 9:05–11. R. N. Boisvert.
A comprehensive treatment of linear programming and its extensions, including postoptimality analysis, goal programming, and the transportation model. Special topics in nonlinear programming, including separable, spatial equilibrium and risk programming models. Input-output models and their role in social accounting matrices and computable general equilibrium models are discussed. Applications are made to agricultural, resource, and regional economic problems.

AG EC 713 Quantitative Methods II
Spring. 4 credits. Prerequisites: ECON 509 and AG EC 710.
Lecs, W F 9:05–11. J. M. Conrad, T. D. Mount.
This course is concerned with the analysis and optimization of dynamic systems. Course objectives are to (1) present the basic theory of dynamical systems and dynamic optimization, (2) introduce associated methods of numerical and econometric analysis, (3) review some applications of dynamic analysis from various subfields in economics, and thereby (4) equip students with basic theory and methods to perform applied research on dynamic allocation problems.

AG EC 717 Research Methods in Agricultural Economics
Spring. 2 credits. Limited to graduate students.
M 1:25–3:20. Staff.
Discussion of the research process and scientific method as applied in agricultural economics. Topics include problem identification, hypotheses, sources of data, sampling concepts and designs, methods of collecting data, questionnaire design and testing, field organization, and analysis of data. During the semester each student develops a research proposal that may be associated with his or her thesis.

AG EC 730 Seminar on Agricultural Trade Policy
Spring. 3 credits. Limited to graduate students. Prerequisites: AG EC 630. Offered alternate years.
Hours to be arranged. D. R. Lee.
This course examines selected topics in the professional literature on agricultural trade policy and related topics, including agricultural and trade policy linkages, imperfect competition and strategic trade policy, and agricultural trade and development.

[AG EC 731 Seminar on Agricultural Policy
Fall. 3 credits. Limited to graduate students. Offered alternate years. Not offered 1992–93.
T R 12:20–1:50. H. de Gorter.
A review of the professional literature relating to agricultural policy issues and techniques appropriate to the analysis of such issues.]

AG EC 740 Agricultural Markets and Public Policy
Spring, weeks 1–7. 2 credits. Limited to graduate students. Prerequisite: familiarity with multiple regression techniques at the AG EC 411 level or higher. Recommended: AG EC 640.
T R 12:20–2:15. W. H. Lesser.
Develops the concepts and methodology for applying and analyzing the effects of public-policy directives to the improvement of performance in the U.S. food marketing system. Topics include a survey of industrial organization principles, antitrust and other legal controls, and coordination systems in agriculture.

AG EC 741 Space, Trade, and Commodity Analysis
Spring, weeks 8–14. 2 credits. Limited to graduate students. Recommended: AG EC 412 or equivalent and AG EC 640.
T R 12:20–2:15. J. Pratt.
Principal topics are spatial micro-economics of the firm, spatial pricing and location decisions, the forms of spatial competition, and quantitative methods for spatial analyses, which include techniques for finding spatial equilibriums and selected network optimization algorithms.

AG EC 750 Resource Economics
Spring. 4 credits. Prerequisites: ECON 509 and 518, or AG EC 713.
Lecs, T R 2:30–4:20. J. M. Conrad.
Optimal control and other methods of dynamic optimization will be used to study the allocation and management of natural resources.

AG EC 751 Environmental Economics
Fall. 4 credits. Prerequisites: ECON 509 and 518, or AG EC 713.
Lecs, T R 2:30–4:20. J. M. Conrad, D. Chapman.
Economic theory will be applied to the problems of managing environmental quality. Static and dynamic models of externality, decisions to preserve or develop natural environments, and methods of valuation will be presented.

AG EC 754 Sociotechnical Aspects of Irrigation (also Rural Sociology 754, Agricultural and Biological Engineering 754, and Government 644)
Spring. 2 or 3 credits. S-U grades optional.
W 7–9:30 p.m. M. Walter, N. Uphoff, R. Barker.
Examines irrigated agriculture and its relation to agricultural development. Emphasis on social processes within irrigation systems and interactions with social setting, including political and administrative aspects. Provides an opportunity to examine systematically the institutional and organizational policy issues associated with the design and operation of systems of irrigated agriculture in developing countries.

AG EC 763 Macro Policy in Developing Countries
Spring. 3 credits. Prerequisites: ECON 509, 510, 513 (may be taken concurrently), or permission of instructor. Offered alternate years.
Lecs, T R 12:20–1:35. S. Kyle.
This course examines macroeconomic policies in developing countries and their interaction with economic growth, development, and stability. Theoretical models useful for analysis of macro policies will be covered as well as an examination of empirical studies. Emphasis will be on research topics of current interest to students and professionals in the field, particularly those relating to the interaction of macro policy with micro and sectoral analysis.

ANIMAL SCIENCE

H. F. Hintz, chair; B. J. Apgar, R. E. Austic, P. W. Aho, D. E. Bauman, D. H. Beermann, A. W. Bell, R. W. Blake, R. D. Boyd, W. R. Butler, L. E. Chase, W. B. Currie, H. N. Erb, R. W. Everett, R. H. Foote, D. G. Fox, D. M. Galton, R. C. Gorewit, D. E. Hogue, P. A. Johnson, L. R. Jones, K. Keshavarz, W. G. Merrill, E. A. Oltenacu, P. A. Oltenacu, J. E. Parks, A. N. Pell, E. J. Pollak, R. L. Quaas, J. B. Russell, R. D. Smith, M. L. Thonney, D. R. Van Campen, P. J. Van Soest, M. J. Wylie

AN SC 100 Domestic Animal Biology I
Fall. 3 credits. S-U grades optional.
Lec, M W F 9:05; lab/disc, T W R 2–4:25.
W. B. Currie, M. L. Thonney, and staff.
An introduction to the science of raising animals in the context of commercial animal production. Lectures and labs address the biology of economically important species (morphology, anatomy, and physiology) and application of the biology to the management of animals within major livestock industries. Topics covered include fundamentals of anatomy, regulatory mechanisms, vital systems, digestion, and metabolism. Students care for small numbers of cattle, sheep, pigs,

and chickens in different phases of their life cycle to maximize hands-on contact. Living animals will be used noninvasively, and fresh organs and tissues from dead animals will be used in laboratories.

AN SC 105 Contemporary Perspectives of Animal Science
Spring. 1 credit. Limited to freshmen, sophomores, and first-year transfers.
T 1:25 or W 12:20. R. C. Gorewit.
A forum to discuss the students' career planning and the contemporary and future role of animals in relation to human needs.

AN SC 110 Animals in Agriculture and Society
Spring. 3 credits. S–U grades optional.
Lec, T R 12:20, lab T 2–4:25. D. E. Hogue.
Primarily for nonmajors who wish to gain a broad understanding of the role of domestic animals in human society from both an historical and a modern agricultural aspect. Laboratories include practical "hands-on" experiences and visits to the university farms. Proper animal care and management are emphasized.

AN SC 150 Domestic Animal Biology II
Spring. 4 credits. S-U grades optional.
Lec, M W F 9:05; lab/disc T W R 2–4:25. W. R. Butler and staff.
Second of a two-semester sequence (100/150) applying the basic biology of growth, defense mechanisms, reproduction, and lactation to aspects of the husbandry of animals within major livestock industries. Fresh tissues and organs from dead animals will be used in laboratories.

AN SC 212 Animal Nutrition
Fall. 4 credits. Prerequisite: CHEM 104 or 208. Recommended: AN SC 100 and 150.
Lecs, M W F 11:15; lab, M T W R or F 1:25–4:25. A. W. Bell.
An introduction to animal nutrition, including digestive physiology and metabolism of livestock and other species; nutrient properties and requirements for different aspects of animal production; principles of feed evaluation and ration formulation. Laboratory classes include gastrointestinal tract dissections and a nutritional experiment performed on a laboratory or farm animal species.

AN SC 213 Nutrition of Companion Animals
Spring, weeks 1–7. 1 credit. Prerequisite: AN SC 212 or equivalent. Offered odd-numbered years.
W 7:30–9:25 p.m. H. F. Hintz.
Nutrition of companion animals, with emphasis on the dog and cat. Digestive physiology, nutrient requirements, feeding practices, and interactions of nutrition and disease.

[AN SC 214 Nutrition of Exotic Animals
Spring, weeks 1–7. 1 credit. Prerequisite: AN SC 212. Offered even-numbered years. Not offered 1992–93.
Lec W 7:30–9:30 p.m. H. F. Hintz.
Principles of nutrition for exotic animals including birds and fish. Nutrient requirements, sources of nutrients, feeding management systems, and ration formulation will be discussed. Signs of nutrient deficiencies and excesses will be described.]

AN SC 221 Introductory Animal Genetics
Spring. 3 credits. Prerequisite: a year of college biology.
Lecs, T R 9:05; disc, T W R or F 2–4:25. E. J. Pollak.
An examination of basic genetic principles and their application to the improvement of domestic animals, with emphasis on the effects of selection and mating systems on animal populations.

AN SC 230 Poultry Biology
Fall. 3 credits. Offered even-numbered years.
Lecs, T R 11:15; lab, W 2–4:25. Field trips during lab periods may last longer. R. E. Austic.
Designed to acquaint the student with the scope of the poultry industry. Emphasis is on the principles of avian biology and their application in the various facets of poultry production. Some laboratory sessions involve dissection and/or the handling of live poultry.

AN SC 251 Dairy Cattle Selection
Spring. 2 credits.
Lab, W 12:20–4:25. D. M. Galton, C. R. Holtz.
Emphasis on economical and type traits to be used in the selection and evaluation of dairy cattle. Practical sessions include planned trips to dairy herds in the state.

AN SC 265 Horses
Spring. 3 credits. Prerequisites: AN SC 100 and 150 or permission of instructor. S-U grades optional.
Lecs, T R 10:10; lab, R 1:25–4:25. H. F. Hintz.
Selection, management, feeding, breeding, and training of light horses.

AN SC 290 Meat Science
Fall. 3 credits.
Lecs, T R 10:10; lab, M T or W 1:25–4:25. D. H. Beermann and staff.
An introduction to meat science through a study of the structure, composition, and function of muscle and its conversion to meat. Properties of fresh and processed meat, microbiology, preservation, nutritive value, inspection, and sanitation are also studied. Laboratory exercises include meat-animal slaughter, meat cutting, wholesale and retail cut identification, anatomy, processing, inspection, grading, quality control, and meat merchandising. An all-day field trip to commercial meat plants is taken.

AN SC 300 Animal Reproduction and Development
Spring. 3 credits. Prerequisite: AN SC 100–150 or equivalent and one year of introductory biology.
Lecs, M W F 10:10. J. Parks.
Comparative anatomy and physiology of domestic animal reproduction. Fertilization through embryonic development, pregnancy, and growth to sexual maturity; emphasis on physiological mechanisms and application to fertility regulation. Separate laboratory offered to demonstrate fundamental and applied aspects of reproduction.

AN SC 301 Animal Reproduction and Development Lab
Spring. 1 credit. Prerequisite: AN SC 100–150 or equivalent. Concurrent enrollment in or completion of AN SC 300 required to register.
Labs, M W or F 1:25–4:25. Each lab limited to 30 students. J. Parks.
Demonstration of fundamental principles and applied aspects of domestic animal reproduction. A limited number of live animals will be used in some demonstrations. Dissection and examination of tissues from vertebrate animals will be included in selected laboratories.

AN SC 305 Farm Animal Behavior (also Biological Sciences 312)
Spring. 2 credits. Prerequisites: an introductory course in animal physiology and an introductory course in genetics; at least one animal production course is recommended. S-U grades optional.
Lec, T R 11:15. E. A. Oltenacu and K. A. Houpt.
The behavior of production species (avian and mammalian) influences the success of any management program. Students will study behaviors relating to feeding, reproduction, and social interactions of domestic animals. Management systems for commercial livestock production and their implications for animal behavior and welfare will be stressed.

AN SC 312 Applied Animal Nutrition
Spring. 4 credits. Limited to 32 students. Prerequisites: AN SC 100, and 212 (or equivalent). Recommended: 1 semester organic chemistry. S-U grades optional.
Lecs, M W F 10:10; lab, T 1:25–4:25. R. D. Boyd and D. G. Fox.
Lectures attempt to strike a balance between biological concepts of nutrition and applied feeding practice with particular emphasis on the dynamics of nutrient requirements in various physiological states of both ruminant and nonruminant farm animals. Dynamic nutrition models are used in the lab to illustrate concepts, and principles are applied to a study of the nutritional programs for selected farms.

AN SC 321 Genetic Improvement of Animals
Spring. 3 credits. Prerequisite: AN SC 221 or equivalent.
Lecs, M W 9:05; lab, T 1:25. P. A. Oltenacu.
Translating genetic principles into effective breeding schemes is approached from the farm and industry perspectives in a decision-making framework. Current animal improvement strategies as well as potential systems incorporating new developments in reproductive biology and molecular genetics will be addressed in genetic and economic terms.

[AN SC 330 Commercial Poultry Production
Fall. 2 credits. Prerequisites: AN SC 100, 150, and 230 or permission of instructor. Offered odd-numbered years. Not offered 1992–93.
F 2–4 (occasional field trips run past 4 p.m.). K. Keshavarz.
The course emphasizes production and business management aspects of commercial poultry farm operation and is designed to acquaint the student with current technology involved in commercial poultry production.]

[AN SC 332 Poultry Hygiene and Disease (also Veterinary Medicine 255)
Fall. 2 credits. Minimum enrollment, 6 students; maximum enrollment, 16 students. Prerequisites: BIO S 290 and permission of the instructor. Offered odd-numbered years. Not offered 1992–93.
Lec, disc, lab, F 2:05–4:25. B. Lucio-Martínez.
A combination of lecture, discussion, laboratory, and literature search exercises. Focuses on the poultry industry structure and management practices and their effect on

poultry health. Selected diseases are used to discuss control through eradication and/or immunization. Includes laboratory demonstration/exercises on anatomy and on bleeding, euthanasia, and necropsy techniques.]

AN SC 341 Physiology of Lactation
Spring. 3 credits. Prerequisite: AN SC 150 or AN SC 300 or equivalent.
Lecs, T R 9:05; lab, R 2–4:25.
R. C. Gorewit.
The physiology of milk production is covered with emphasis on mammary gland development, anatomy, hormonal control of milk secretion, and the biosynthesis of milk constituents. The dairy cow serves as the model system, but all livestock species are considered.

AN SC 350 Dairy Cattle
Fall. 3 credits. S-U grades optional. Recommended: AN SC 150 or equivalent, 212 and 221.
Lecs, T R 10:10; lab, M T R 1:25–4.
D. M. Galton, C. R. Holtz.
Introduction to the background and scientific principles relating to dairy cattle production. Laboratories are designed to provide an understanding of production techniques. This course is a prerequisite for Animal Sciences 351.

AN SC 351 Dairy Herd Management
Spring. 4 credits. Prerequisites: AN SC 350 or permission of instructor. Recommended: AG EC 302.
Lecs, M W F 11:15; labs, M T 1:25–4:25, F (alternate weeks) 1:25–4:25.
D. M. Galton and staff.
Application of scientific principles to practical herd management with components of reproduction, genetics, milking, housing, and records. Laboratories emphasize practical applications, analyses of alternatives, decision making, field trips, and discussion.

AN SC 360 Beef Cattle
Spring. 3 credits. Limited to 32 students.
Lecs, T R 10:10; lab, W 2–4:25.
M. L. Thonney.
Emphasis is on the management of reproduction, nutrition, and selection in beef cattle enterprises. A cattle growth model is studied. Laboratories acquaint students with the management skills needed for a beef operation. Students are required to spend several days during the semester feeding and caring for cattle and observing calving.

AN SC 370 Pig Production and Biology
Fall. 3 credits. Recommended: AN SC 100.
Lecs, T R 11:15; lab, T 2–4:25. R. D. Boyd.
Lectures emphasize fundamentals in production management and the biological basis for recommended practices and developments in pig production. Labs apply principles discussed in lecture with emphasis on "hands-on" experience. Opportunity for extensive experience is available through Cornell Pig Teaching and Research Farm.

AN SC 380 Sheep
Fall. 3 credits.
Lec, T R 9:05; lab and disc periods, W 1:25–4:25 every other week. D. E. Hogue.
The breeding, feeding, management, and selection of sheep from a production-system approach. Lectures and laboratories are designed to give students a practical knowledge of sheep production as well as the scientific background for improved practices.

AN SC 392 Animal Growth Biology
Fall. 2 credits. Not open to freshmen; sophomores by permission of instructor only. Prerequisites: one year of college biology and one course in animal or human physiology, AN SC 212 and 221.
Lec, R 1:25–3:25; disc, F 1:25–2:15.
D. H. Beermann.
A detailed discussion of the anatomy and physiology of growth in domestic farm animals. Cellular aspects of tissue-growth patterns, their relationship to body composition, and measurement of growth and body composition will be discussed. Endocrine, genetic, nutritional, and pharmacological influences on growth, metabolism, and body composition will be emphasized.

[AN SC 400 Tropical Livestock Production
Spring. 3 credits. Prerequisite: AN SC 150 or equivalent, 212, or 221 or permission of instructor. Not offered 1992–93.
Lecs, T R 9:05; disc W 1:25–3:20.
R. W. Blake.
An analysis of constraints on livestock production in developing countries of the tropics, economic objectives and risk, and production methods. Emphasis is on strategic use of animal and plant resources, animal performance with inputs restricted, decision making, and alternative systems of production. Principles, real examples, and independent study projects will help identify research to improve food security.]

AN SC 401 Dairy Production Seminar
Spring. 1 credit. Limited to juniors and seniors.
Disc, M 7 p.m. D. E. Bauman.
Students, with the help of faculty members, complete a study of the research literature on topics of current interest in the dairy industry. Students make oral and written reports.

AN SC 402 Seminar in Animal Sciences
Spring. 1 credit. Limited to juniors and seniors. May be repeated. S-U grades optional.
M 4:30; then hours to be arranged.
W. R. Butler and staff.
Review of literature pertinent to topics of animal science or reports of undergraduate research and honors projects. Students present oral reports of their work for class discussion in addition to written reports.

[AN SC 403 Tropical Forages
Spring. 2 credits. Limited to seniors and graduate students except by permission of instructor. Prerequisites: crop production and livestock nutrition. Offered even-numbered years. Not offered 1992–93.
Lecs, T R 12:20. P. J. VanSoest.
An overview of tropical grasslands, seeded pastures, and crop residues as feed resources; grass and legume characteristics; establishment and management of pastures; determination of feeding value forages and crop residues; physiology of digestion of ruminants that affects feeding behavior of various species; problems of chemical inhibitors in plants; and utilization of tropical forages as hay or silage.]

AN SC 410 Principles of Animal Nutrition
Fall. 3 credits. Prerequisite: organic chemistry. Recommended: biochemistry or concurrent registration in a biochemistry course.
M W F 11:15; 2 discs to be arranged.
2 evening prelims to be arranged.
C. C. McCormick.
A fundamental approach to nutrition focusing on the metabolism as well as the biochemical and physiological function of the known nutrients. The basic principles of nutrition are elaborated with examples drawn from a broad range of animal species, including humans. Emphasis is also directed toward nutritional techniques and the application of the topics covered.

AN SC 415 Poultry Nutrition
Spring. 1 credit. Prerequisite: AN SC 410 or permission of instructor.
F 11:15. G. F. Combs, Jr.
A practical consideration of principles of nutrition applied to feeding poultry, including use of linear programming techniques in diet formulation.

AN SC 420 Quantitative Animal Genetics
Fall. 3 credits.
Lecs, T R 11:15; lab, W or R 2–4:25.
E. J. Pollak.
A consideration of problems involved in improvement of animals, especially farm animals, through application of the theory of quantitative genetics, with emphasis on selection index.

AN SC 427 Fundamentals of Endocrinology
Fall. 3 credits. Prerequisite: animal or human physiology or permission of instructor.
Lecs, M W F 9:05. P. A. Johnson.
Physiology and regulation of endocrine secretions. Neuroendocrine, reproductive, growth, and metabolic aspects of endocrinology are emphasized. Examples are selected from many animals, including humans.

AN SC 430 Embryo Biotechnology
Spring. 1 credit. Prerequisite: a course in reproductive physiology and permission of instructor at preregistration. Limited enrollment. Fee of $250 includes books and supplies.
All day, 5 days during spring break.
. H. Foote.
Principles and practice of superovulation, freezing of embryos, in vitro fertilization, embryo collection, evaluation, embryo culture, micromanipulation, and transfer in cattle and rabbits. Embryo transfer may require surgery.

AN SC 455 Dairy Nutrition and Health
Fall. 3 credits. Prerequisite: AN SC 351 and permission of instructor.
Lecs, T R 11:15; lab, M T 1:25–4:25; F (alternate weeks) 1:25–4:25. C. R. Holtz, D. M. Galton.
Application of scientific principles to practical herd management with components of nutrition and herd health. Laboratories emphasize practical applications, analyses of alternatives, decision making, field trips, and discussion.

AN SC 456 Dairy Management Fellowship
Spring. 2 credits. Limited to seniors. Prerequisites: AN SC 351 and 455, and permission of instructor. S-U grades only.
Hours to be arranged. D. M. Galton, C. R. Holtz.
The program is designed for undergraduates who have a sincere interest in dairy farm management. Objectives are to gain further understanding of the integration and application of dairy farm management principles and programs with respect to

dairymen's objectives and methodology, to expand the concept of team approach in the development and implementation of management programs, and to gain further understanding of the role of research and industry in agriculture.

AN SC 457 Livestock Fellowship
Spring. 2 credits. Prerequisite: permission of instructor. S-U grades only.
Hours to be arranged. D. E. Hogue and staff.
A program for students with particular interests in meat animal production, beef cattle, sheep, and swine. Objectives are to gain a more thorough understanding of the production of these species and their integration in various farm management situations. Students will participate in extension education programs and have contact with representative livestock producers as well as the agribusiness organizations important to livestock production.

[AN SC 490 Commercial Meat Processing
Spring. 3 credits. Prerequisite: AN SC 290 or permission of instructor. Not offered 1992–93.
Lecs, T R 9:05; lab, T 1:25–4:25. Field trip to commercial meat processing plants. D. H. Beermann.
A study of the classification, formulation, and production of commercially available processed meat products. Physical and chemical characteristics of meat and nonmeat ingredients; their functional properties; various processing methodologies; microbiology; packaging, handling, and storage; and quality assurance are discussed.]

AN SC 496 Animal Sciences Honors Seminar
Fall. 1 credit. S-U grades only. Students must be accepted into the Animal Sciences Honors Program.
Hours to be arranged. Animal Science honors committee.
The course is designed to provide information and guidance for students enrolled in the honors program in animal sciences and expecting to complete an honors thesis. The course will meet for 1-1/2 hours per week for 8 to 10 consecutive weeks, during which time the following topics will be presented and discussed: requirements and expectations of the honors program, formulating hypotheses, the scientific method, experimental design, data handling and manipulation, library usage and literature search techniques, animals in research, ethics in science, and scientific writing.

AN SC 497 Special Topics in Animal Science
Fall or spring. 1–3 credits; may be repeated for credit. Intended for students in animal sciences. Prerequisite: permission of instructor. Students must register with an Independent Study form (available in 140 Roberts Hall). S-U grades optional.
Staff.
May include individual tutorial study or a lecture topic selected by a professor. Since topics may change, the course may be repeated for credit.

AN SC 498 Undergraduate Teaching
Fall or spring. 1 or 2 credits; 4 credits maximum during undergraduate career. Limited to students with grade-point averages of at least 2.7. Students must register with an Independent Study form (available in 140 Roberts Hall).
Designed to consolidate the student's knowledge. A participating student assists in teaching a course allied with the student's education and experience. The student is expected to meet regularly with a discussion or laboratory section, to gain teaching experience, and regularly to discuss teaching objectives, techniques, and subject matter with the professor in charge.

AN SC 499 Undergraduate Research
Fall or spring. 6 credits maximum during undergraduate career. Not open to students who have earned 6 or more undergraduate research credits elsewhere in the college. Limited to juniors and seniors with grade-point averages of at least 2.7. Students must register with an Independent Study form (available in 140 Roberts Hall).
Affords opportunities for students to carry out independent research under appropriate supervision. Each student is expected to review pertinent literature, prepare a project outline, conduct the research, and prepare a report.

AN SC 600 Research
Fall or spring. Credit to be arranged. S-U grades optional.
Hours to be arranged.
Faculty in the field of animal science.

[AN SC 601 Proteins and Amino Acids (also Nutritional Sciences 601)
Spring. 2 credits. Prerequisites: physiology, biochemistry, and nutrition, or permission of instructor. Offered even-numbered years. Not offered 1992–93.
W F 12:20. R. E. Austic.
A course in amino acid and protein nutrition, with emphasis on the dynamic aspects of protein digestion and amino acid absorption, protein and amino acid metabolism, nutritional interrelationships, and assessment of amino acid availability and amino acid requirements.]

AN SC 604 Vitamins
Fall. 2 credits.
T R 10:10. G. F. Combs, Jr.
The biochemical, physiological, and clinical aspects of the vitamins presented in an interactive discussion-based format.

AN SC 605 Forage, Fiber, and the Rumen
Spring. 4 credits. Prerequisites: either general nutrition and biochemistry or permission of instructor. S-U grades optional. Offered odd-numbered years.
M W F 12:20; disc, W 11:15 or F 1:25. P. J. Van Soest.
Ruminant nutrition; lower-tract fermentation in monogastrics; nutritional biochemistry of forage plants, fiber, and cellulosic material.

[AN SC 607 Microbiology of the Rumen
Fall. 3 credits. Prerequisites: general biochemistry and microbiology. Not offered 1992–93.
Lecs, M W F 10:10. J. B. Russell.
Nutrition, biochemistry, physiology, taxonomy, and ecology of rumen microorganisms. Effects of rumen microbial ecology on ruminant nutrition. Manipulation of rumen fermentations to maximize host-animal performance.]

AN SC 610 Seminar
Fall and spring. 1 credit. Required of all graduate students with a major or minor in animal sciences. S-U grades only.
T 11:15. Department faculty.

AN SC 613 Forage Analysis
Spring. 2 credits. Prerequisite: permission of instructor. S-U grades optional.
Lab, R 2–4. P. J. Van Soest.
Chemical composition and nutritive evaluation of forage plants and related materials. The course includes a term paper summarizing results of independent laboratory study of either materials or methods.

AN SC 619 Field of Nutrition Seminar
Fall and spring. No credit. No grades given.
M 4:30. Faculty and guest lecturers.
Lectures on current research in nutrition.

AN SC 620 Seminar in Animal Breeding
Fall and spring. 1 credit. Limited to graduate students with a major or minor in animal breeding. S-U grades only.
Hours to be arranged.

AN SC 621 Seminar: Endo/Reprod Biology
Fall and spring. 1 credit. Registration limited to graduate students. Advanced undergraduates welcome to attend. S-U grades only.
W 4:30. W. R. Butler and staff.
Current research in reproductive physiology is presented by staff members, graduate students, and visitors.

AN SC 630 Bioenergetics/Nutritional Physiology
Spring. 3 credits. Prerequisites: AN SC 410 and biochemistry or physiology, or permission of instructor. S-U grades optional.
Lec, M W F 10:10. A. W. Bell and D. E. Bauman.
An integrated systems approach to the nutritional physiology and energy metabolism of productive animals. Emphasis on extracellular regulation of tissue and organ metabolism of specific nutrients in relation to pregnancy, lactation, and growth. Critical discussion of techniques and approaches to the study of animal bioenergetics.

AN SC 640 Special Topics in Animal Science
Fall or spring. 1 or more credits. S-U grades optional.
Hours to be arranged. Staff.
Study of topics in animal science more advanced than, or different from, other courses. Subject matter depends on interests of students and availability of staff.

[AN SC 720 Advanced Quantitative Genetics
Spring. 3 credits. Prerequisites: matrix algebra, linear models, and mathematical statistics. S-U grades optional. Offered even-numbered years. Not offered 1992–93.
Hours to be arranged. R. L. Quaas.
Estimation of genetic and environmental parameters required to design efficient selection programs. Emphasis is given to interpretation of experimental and survey data with unequal subclass numbers, and prediction of genetic progress resulting from alternative selection methods.]

Related Courses in Other Departments

Introductory Animal Physiology (Biological Sciences 311)

Introductory Animal Physiology Laboratory (Biological Sciences 319)

Milk Quality (Food Science 351)

Agriculture in the Developing Nations (International Agriculture 602)

Lipids (Nutritional Sciences 602)

Basic Immunology, Lectures (Biological Sciences 305)

Basic Immunology, Laboratory (Biological Sciences 307)

BIOLOGICAL SCIENCES

The program of study in biology is offered by the Division of Biological Sciences. For course descriptions, see the section on the Division of Biological Sciences.

COMMUNICATION

R. D. Colle, chair; N. E. Awa, B. O. Earle, J. Earle, G. Gay, C. J. Glynn, D. A. Grossman, J. E. Hardy, B. Lewenstein, D. G. McDonald, R. E. Ostman, N. Patten, R. Roe, T. M. Russo, C. Scherer, D. F. Schwartz, M. A. Shapiro, P. Stepp, R. B. Thompson, M. Toor, L. VanBuskirk, W. B. Ward, S. Warland, S. A. White, J. P. Yarbrough

The middle and last digits of course numbers are used to denote specific areas:

00–09 Speech communication

10–19 Interpersonal communication

20–29 Mass communication

30–39 Visual communication and graphic design

40–49 Electronic media

50–59 Journalistic writing

60–66 Professional writing

67–69 Editing

70–79 Communication planning and strategy (advertising and public relations)

80–89 Research methods and interdisciplinary courses

90–94 Special topics and seminars

95–99 Individualized study

COMM 101–109 Rhetorical Scholarship Lab
Fall and spring. Maximum 1 credit per semester; may be repeated up to 6 credits in different labs. Limited to 20 communication majors or students with permission of instructor. S-U grades only.

Lec, hours to be arranged. P. Stepp and staff.

Students research and analyze contemporary issues to identify facts and derive the underlying values. Research will be used to write lines of argument, cases for debate, and speeches for public address, or to analyze pieces of literature to understand the author's intent. Analyses will be used to develop approaches to the oral presentation of the literature.

COMM 101 Debate: Affirmative Case

COMM 102 Debate: Value Objections

COMM 103 Debate: Briefs

COMM 104 Public Address: Persuasion

COMM 105 Public Address: Rhetorical Criticism

COMM 106 Public Address: Informative

COMM 107 Oral Interpretation: Prose

COMM 108 Oral Interpretation: Poetry

COMM 109 Oral Interpretation: Dramatic Duo

COMM 116 Theories of Human Communication
Spring or summer. 3 credits. Not open to first-semester freshmen. S-U grades optional.

Spring: lecs, M W 12:20; disc., F 12:20. R. Roe.

Designed to introduce students to the basic areas of study common in communication theory and research. Basic ideas and theories about language, interpersonal communication, small-group communication, nonverbal communication, organizational communication, and the mass media will be covered.

COMM 120 Introduction to Mass Media
Fall or summer. 3 credits. S-U grades optional.

Fall: lecs, M W F 12:20. D. McDonald.

History, processes, philosophies, policies, and functions of U.S. communication media. The media are examined individually and collectively in regard to content, economics, production, effects of messages, regulation, and other contemporary issues.

COMM 190 Communication Perspectives Seminar
Fall. 1 credit. S-U grades optional. Possible field trip(s).

Lec, M 1:25. B. O. Earle and staff.

(Open to freshmen/transfer students in the Department of Communication.) The course will provide an orientation to the department and university and serve as a forum to discuss contemporary and future roles of communication in society. Presentations by Cornell faculty and staff members, and by professionals in the field. Topics will be selected from areas such as new technology, constitutional and policy issues, career opportunities, professionalism and ethics, societal changes and implications.

COMM 201 Oral Communication
Fall, spring, or summer. 3 credits. Each section limited to 24 students (fall and spring) or 15 students (summer). Preference given to sophomores, juniors, and seniors. Students missing the first two class meetings without university excuse are dropped so others may register. No student will be added or dropped after the second week of classes.

Disc, M W F 8; M 8 and W F 9:05; M 9:05 and W F 8; M W F 9:05; M 9:05 and W F 10:10; M 9:05 and W F 11:15; M 9:05 and W F 12:20; M W F 10:10; M 10:10 and W F 11:15; M F 11:15 and W 1:25; M F 12:20 and W 1:25; M 12:20 and W F 9:05; M 12:20 and W F 10:10; M W F 1:25; M T W 12:20; T R 9:05 and W 12:20; T R 10:10 and W 12:20; T R 10:10 and W 1:25; T R 11:15 and W 12:20; T R 11:15 and W 1:25; T W R 12:20 and W 1:25; T W R 1:25; M 10:10 and T R 9:05; M T R 10:10. Some section times may be omitted in some semesters. See the summer catalog for summer semester times. R. B. Thompson, R. Roe, T. Russo, P. Stepp, N. Patten, and staff.

Through theory and practice students develop self-confidence and competence in researching, organizing, and presenting material to audiences. Students give four graded speeches, write short papers, perform speaker evaluations, and engage in other speech-related activities.

COMM 203 Argumentation and Debate
Fall, spring, or summer. 3 credits.

T R 12:20–1:45. P. Stepp.

The student will learn the principles of argumentation and the rules of debate. Classroom debates on the CEDA national topic will provide experience in critical thinking, rapid organization of thoughts, employment of research, and writing and speaking in a logical, persuasive manner.

COMM 204 Effective Listening
Fall, spring, or summer. 3 credits. Limited to 25 nonfreshman students per section. No students accepted or allowed to drop after the second week of classes.

Lec, M 1:25–2:40; lab, T, W, R, or F 1:25–2:40. Evening prelim: fall, Oct. 18 and Nov. 17; spring, March 11 and Apr. 22. S. Warland.

Lecture and sections are used to present an analysis of the process of listening, to identify barriers to effective listening, and to develop students' listening skills. Topics include audiology, cultural contexts, intercultural communication, linguistics, therapeutic listening, and critical analysis of information. Students are involved in skill-building exercises and in writing self-analytical papers, as well as attending seminars.

COMM 216 Communicating Interpersonally
Fall, spring, or summer. 3 credits. Prerequisite: Communication 116 or permission of instructor. Not open to freshmen. (Communication sophomore majors are given first priority.)

Lecs, T R 10:10–11:30. S. Warland.

The course emphasizes understanding the dynamics affecting interpersonal communication in personal, social, and professional circumstances. It addresses self-awareness, assertiveness, person perception, attraction, and conflict management. Instruction techniques include in-class exercises, assigned reading, class discussion and lecture, plus report of field observation and journal-keeping assignments.

COMM 230 Visual Communication
Fall. 3 credits. Limited to nonfreshmen and communication freshmen. Not recommended for design or art majors. Cost of individual project materials, $20-$30.

Lec, T R 9:05; computer lab 1, T 1:25–3:20, lab 2, R 3:35–5:30, lab 3, F 1:25–3:20, lab 4, F 10:10–12:05. C. Scherer.

A basic course in the use and importance of visual communication. Course focuses on objectives, audiences, and methods of visual production. Particular emphasis is placed on the visual communication of scientific and technical information. The laboratory concentrates on the use of computers for production of visual materials. Practical projects are assigned.

COMM 232 Art of Publication
Fall, spring, or summer. 3 credits. Each lab limited to 25 nonfreshman students. Students missing the first two classes without university excuse are dropped so others may register. Project materials cost $50–$75.

Fall and spring. M or W 1:25–4:25. M. Toor.

A basic course designed to explore visual concepts that increase communication effectiveness through the printed word. The importance of selecting and coordinating

format, layout, typography, and illustrations is stressed. Lectures, in-class laboratory assignments, and outside projects examine opportunities and problems in publication design and desktop publishing.

[COMM 234 Photo Communication
Summer only. 2 credits. A lecture course for those with limited experience in photography. Students are expected to supply their own cameras. Not offered 1992–93.

Hours to be arranged. Staff.
Basic photography; photojournalism is emphasized during the latter part of the course.]

COMM 250 Newswriting for Newspapers
Fall, spring, or summer. 3 credits. Limited to 25 students. Prerequisite: Comm 150, major in communication, or permission of instructor. Keyboarding ability essential. Students missing first two classes without university excuse will be dropped.

Lec, R 1:25–2:20; lab, R 2:30–4:25, plus out-of-class writing assignments. J. Earle.
Writing and analyzing news stories. A study of the elements that make news, sources of news, interviewing, writing style and structure, press problems, and press-society relations. Concentration on newswriting as it is practiced by newspapers in the United States. Two writing assignments each week, one done in class, one done out of class.

COMM 272 Principles of Public Relations and Advertising
Fall or summer. 3 credits. Preference given to ALS students. Not open to freshmen.

Lecs, M W 12:20; lab, to be arranged. Staff.
Survey of the fields of public relations and advertising. Descriptions of organizations, jobs, and functions in the industry. The roles of public relations and advertising in society, the economic system, and organizations. Psychological and sociological principles as formulations for appeals. Strategies for media selection and message execution. Introduction to research and regulation.

COMM 301 Business and Professional Speaking
Fall, spring, or summer. 3 credits. Prerequisite: Communication 201.

Lec, M 11:15; lab, T 10:10–12:05, 1:25–3:20 or W 11:15–1:10. B. Earle.
The study and practice of written and oral communication skills used in formal and informal organizations, including interviews, informative and persuasive speeches, reports, and discussions. Students exercise and enhance the organizational, analytical, and presentational skills needed in particular settings suited to their own business and professional careers.

COMM 314 Small-Group Communication
Spring. 3 credits. Limited to juniors and seniors. Prerequisite: Communication 116 or permission of instructor.

T R 1:25–3. N. E. Awa.
The course is designed to help students explore the dynamics of group interaction processes through (1) exposure to small-group constructs and research, and (2) development of skills vital to the application of principles to real life situations. The approach is eclectic, covering theories from such cognate fields as psychology, sociology, education, and organizational behavior. Students will learn experientially about groups by participating in group (problem solving) projects. Among the areas covered are the role of groups in contemporary society, leadership, decision making and problem solving techniques, conflict management and resolution, groups in business and industry, and team development.

COMM 316 Rhetorical Theory
Fall. 3 credits. Limited to 20 communication majors. Prerequisites: Communication 116 and 201 or permission of instructor.

M W F 1:25. R. Thompson.
Considers current views of rhetoric in historical perspective. Shows how assumptions about communication both shape the worldview of the communicator and either aid or hinder the reaching of various communication goals. Treats historical figures briefly; focuses on contemporary thinkers such as Toulmin, Ong, Burke, Habermas, Foucault, Perelman, Richards, Kuhn. Second half of course taught in seminar format.

COMM 342 Electronic Media
Spring or summer. 3 credits. Limited to 18 communication majors. Prerequisites: Comm 120 and 150.

Lec, T 1:25; lab, R 1:30–3:30. T. Russo.
The techniques of audio and video message design and production. Emphasis on development of pre- and postproduction skills needed for the development of effective audio/video production. Students complete exercises designed to develop specific competencies and work on projects from conception through production.

COMM 346 Television Writing and Production
Fall. 3 credits. Limited to 30 communication majors. Prerequisite: Communication 342.

Lec, M 1:25–3:20; lab, evening hours to be arranged. D. McDonald.
Television and video production. Students gain experience in studio and field production. Lectures concentrate on developing a sense of project planning and production aesthetics; lab concentration is on producing full-scale information, documentary, or public affairs programs from development of the idea through research, scripting, planning, and production.

[COMM 348 Video Communication
Fall. 3 credits. Prerequisites: Communication 342, and/or permission of instructor. Not offered 1992–93.

R 1:25–4:25. S. A. White.
An overview of video communication research and application, and visual articulation as foundation for constructing messages using participatory approaches, leading to a hands-on team project. Increase knowledge and skill in video production utilizing basic camcorders and editing equipment. Emphasis is on use of video as a communication tool in organizations grounded in organizational and visual communication theory.]

COMM 350 Writing for Magazines
Fall or spring. 3 credits. Limited to 25 juniors, seniors, and graduate students, or others with permission of instructor. No drops after third week. Extensive out-of-class writing assignments.

Fall: M 1:25–4:25, W. B. Ward; spring: T R 11:15–12:45. J. Earle.
A course in nonfiction freelance writing for magazines. Intensive fact writing to help students communicate more effectively through the medium of the printed word in magazines. Art and techniques of good writing are studied; magazines in many fields of interest are reviewed. All articles are analyzed and returned to the student to rewrite and submit to a magazine.

COMM 352 Science Writing for the Mass Media
Fall. 3 credits. Not open to freshmen. Limited to 25 students. Prerequisite: one college writing course.

Lecs, M W F 9:05. B. Lewenstein.
Both the "how-to" and the content of science, technology, and medical writing for the mass media. Discussion topics include accuracy, simplicity, comprehensiveness, risk communication, and the history and social structure of science. Writing assignments focus on writing news and feature stories for newspapers and magazines, with excursions into newsletters, radio, TV, and other media.

COMM 354 Print Media Laboratory
Fall. 3 credits. Limited to junior, senior, and graduate communication majors. Prerequisite: Communication 232, 250, or 350.

R 1:25–4:25. J. E. Hardy and staff.
Writing, editing, and layout principles practiced in publishing the Cornell Countryman. Some additional outside work sessions will be required. Students will use microcomputers.

COMM 356 Print Media Laboratory
Spring. 3 credits. Limited to junior, senior, and graduate communication majors. Prerequisite: Communication 232, 250, or 350.

R 1:25–4:25. J. E. Hardy and staff.
A continuation of Communication 354. Students will use microcomputers.

COMM 357 Advanced Reporting
Fall and spring. 3 credits. Limited to 12 juniors and seniors.

T 1:25–4:25. J. Earle.
A course in sophisticated reporting techniques for students with basic reporting and newswriting skills. Students work independently on producing news stories of publishable merit. The emphasis is on information gathering, conducting document searches, document authentication, and identification of experts. Not open to graduate students.

COMM 360 Scientific Writing for Public Information
Fall and spring. 3 credits. Limited to 25 nonfreshman or graduate students per section. Prerequisite: any college-level writing course.

Fall: lecs, M W F 9:05, L. VanBuskirk, T R 9:05 and W 11:15, T R 10:10 and W 12:20, J. E. Hardy. Spring: M W F 9:05, L. VanBuskirk, T R 10:10 and W 12:20, J. E. Hardy.
An intensive course in simplifying scientific and technical material for specific audiences within the general public. Weekly assignments include instructions, descriptions, explanations, and summaries in such formats as the newsletter, brochure, and report. Audience analysis will be emphasized. Not oriented to the mass media.

COMM 363 Organizational Writing
Fall, spring, or summer. 3 credits. Limited to 25 junior, senior, or graduate students per section. Prerequisite: any college-level writing course.
M W F 11:15 and 12:20. L. VanBuskirk, and staff.
Students write as members of different organizations, in the position of supervisor, subordinate, colleague, and representative of business, government, community, and other organizations. Emphasis on adapting tone to the audience and the purpose of the message. Weekly writing assignments include various kinds of internal and external reports, memoranda, proposals, and letters. Assignments based on the Exxon Valdez oil spill and other case studies.

COMM 365 Writing in the Sciences and Engineering
Summer only. 3 credits. Limited to 25 junior, senior, or graduate students per section. Prerequisite: any college-level writing course.
M W F 10:10. Staff.
Students write scientific or technical material for colleagues in their own field. The objective is clear, concise writing, with attention to grammatical construction, usage, paragraph development, and organization. Weekly writing assignments include scientific or technical instructions, descriptions of equipment and procedures, definition and explanation of concepts, graphic presentations and discussion of data, abstract and summary, memorandum, research proposal, progress report, and research report.

COMM 368 Editing
Spring. 3 credits. Limited to 25 junior, senior, or graduate students. Prerequisite: Communication 250, 350, 352, 360, or 365.
W F 10:10–11:25. J. E. Hardy.
Students will follow the process that takes a manuscript from final draft to page proof. Emphasis will be on copy editing, proofreading, fitting copy, working with authors, making editorial decisions, and developing skill in critical reading. Appropriate for any student who expects to work with manuscripts or do editorial work.

[COMM 372 Advanced Advertising
Fall and spring. 3 credits. Prerequisites: Communication 272. Enrollment preference given to communication or marketing majors. Not offered 1992–93.
Lecs, M W 2:30–3:20; labs, M W 3:20–4:25. Staff.
Course is designed to be the second or advanced part of the study of advertising. It provides a more in-depth background on how advertising programs and techniques function. Especially structured for students with a strong, serious career interest in advertising, marketing, sales promotion and public relations. Emphasis on very practical learning of tools and techniques, conceptual thinking, creativity, campaign development and hands-on learning experiences. Designed to equip students for the challenges of the real world.]

COMM 375 Communication Planning and Strategy I
Fall. 3 credits. Limited to 35 juniors and seniors. Prerequisite: Communication 272 or permission of instructor.
Lec, T R 10:10–12:05. Staff.
Theories that guide and influence the solutions to public relations and public information problems in agriculture, business, government, social welfare, and other organizations. Examination of the process of the formation of public opinion. Discussion of research techniques and communication tools used in communication planning, and fundamentals of developing a communication plan. Case studies and projects.

[COMM 376 Communication Planning and Strategy II
Spring. 3 credits. Limited to 25 juniors and seniors. Prerequisite: Communication 375 or permission of instructor. Not offered 1992–93.
Lec and lab, T R 10:10–11:40. C. Glynn.
A continuation of Communication 375. Focus is on the development and implementation of actual communication campaigns. Students work closely with a community organization in designing and implementing a communication program.]

COMM 380 Independent Honors Research in Social Science
Fall or spring. 1–6 credits. Limited to undergraduates who have met the requirements for the honors program.
B. Lewenstein.

COMM 382 Survey Research Methods
Fall or spring. 3 credits. Limited to 20 junior, senior, or graduate communication majors; others by permission of instructor. Prerequisite: Communication 116 or 120 or permission of instructor.
Fall: M W 12:20, lab F 12:20–2:15, P. Yarbrough; spring: M W 11:15, lab F 11:15–1:10. R. Ostman.
Analysis of the foundation for public opinion polls, market research, media audience ratings, readership surveys, and communication impact designs. Development of class research project from research question to final report. Computer use of Statistical Package for the Social Sciences (SPSS) to assist in data analysis. Familiarity with basic statistical concepts helpful.

COMM 410 Organizational Behavior and Communication
Fall or summer. 3 credits. Labs limited to 15 junior, senior, or graduate students. Prerequisite: Communication 116 or equivalent.
Lec, T R 12:20; lab 1, W 1:25–3:20; lab 2, R 2:30–4:20. D. Schwartz.
Study of management and leadership in formal organizations with emphasis on the psychology of communication between supervisor and employee; examination of formal and informal communication networks, and interpersonal communication in an organizational context. Case studies analyzed in lab.

COMM 416 Psychology of Communication
Fall. 3 credits. Prerequisite: Communication 116 or permission of instructor.
T R 10:10–11:30. N. E. Awa.
An advanced multidisciplinary study of communication theory. Topics include personal interaction, channels of communication, and effectiveness of messages. Study includes intensive analysis of major communication theorists.

COMM 418 Persuasion
Spring. 3 credits. Prerequisite: Communication 116 or permission of instructor.
Lecs, M W F 11:15. M. Shapiro.
The course explores the influence of communication in persuasion and attitude change. Topics may include persuasion as it applies to mass communication, advertising, public communication, or interpersonal communication.

[COMM 420 Media Industries
Fall, even-numbered years. 3 credits. Limited to communication majors. Prerequisites: Communication 120 and 272. Not offered 1992–93.
T R 1:25–3:20. D. McDonald.
The workings and functions of mass media industries. Emphasis is placed on the structure of media industries, audience research, media economics programming, and the organization of content production. For several projects, students will use microcomputers and work with data supplied by an audience research firm.]

COMM 426 Ethics in the Media
Fall. 3 credits. Prerequisites: Communication 120 or permission of instructor.
Lecs, T R 9:05–10:35. J. Earle.
Course will examine the moral questions of deception, trade-offs in public vs. private interests, and manipulation in the context of specific issues arising in the daily operation of the media. Students will read or view cases, usually in advance of class, in preparation for discussion. Participants from the media will be present in class as often as possible. In addition, there will be assigned readings in moral philosophy and ethics as background for case discussion. Requirements for the course are two papers, due mid-term and at the end of the semester. Students from disciplines outside communication are encouraged to enroll.

COMM 428 Communication Law
Spring. 3 credits. Limited to junior, senior, and graduate students.
M W F 11:15. D. A. Grossman.
A practical survey of the law governing mass media, primarily for those working in the field. Coverage includes restraints on news gathering and publication, privacy, defamation, copyright, broadcast and cable regulation, access, and other issues of current interest.

COMM 439 Interactive Multimedia: Design and Research Issues
Fall. 3 credits. Prerequisite: permission of instructor.
Lec, T 10:10–1:10. Geri Gay.
An overview of interactive multimedia technologies (videodisc, DC-ROM, digital video interactive [DVI], computer graphics, and text). Course will focus on theories and research applicable to interactive multimedia such as visualization, learner control, mental models, knowledge representations, and information processing. Course will emphasize interactive multimedia design, application, and evaluation.

COMM 460 Video Communication I: Basic Concepts and Theory, Planning, and Participatory Production
Summer only. 2 credits. Fee: $50.00.
T R 9:00–4:00. S. White.
The course focuses on understanding video as a tool in development communication. Hands-on instruction covers use of the video portapak and editing systems. Participants produce videotapes emphasizing the power of images, video for individual feedback, group process observation, and process intervention for individual and community development.

COMM 461 Video Communication II: Video for Development/Social Intervention
Summer only. 3 credits. Prerequisite: Communication 460 or equivalent. Fee: $50.00
M W F 10:00–1:00. S. White and staff.
The use of video in participatory message construction within the context of development. In addition to classroom instruction, participants work as production teams with "grass-roots" groups to create a videotape design to meet a development objective.

[COMM 465 Scientific Rhetoric
Spring. 3 credits. Not offered 1992–93.
T 2:30–4:30, discussion to be arranged.
Exploration of the development of scientific discourse since the Scientific Revolution, with special emphasis on understanding the rhetorical purposes served by differing forms and techniques both in historical context and in contemporary science. Readings will include classics from Newton, Darwin, Einstein, and others, along with representative samples of more routine scientific communications. Students will prepare brief reports and mid-term and final papers. Course meets with Hist/STS 465, "Scientific Rhetoric in Historical Perspective."]

COMM 490 Special Topics in Communication
Fall, spring, or summer. 1–3 credits variable. S-U grades optional. Prerequisite: permission of instructor.
Hours to be arranged. Staff.
Study of topics in communication not otherwise provided by a department course and determined by the interest of the faculty and students.

[COMM 490.03 Gender and Communication
Fall. 3 credits. Not offered 1992–93.
Lecs, M W 3–4:30. L. VanBuskirk.
Course will examine how gender influences and is influenced by our ways of communicating with one another. Topic areas will include gender roles, language and gender, nonverbal communication, and relationship communication. Students will be asked to read appropriate sources and engage in a variety of learning activities; group discussions. Four papers, including one research paper.]

COMM 492 Listening and Contemporary Management: Issues and Responsibilities
Fall. 1–2 credits (final paper required for 2 credits). Limited to 24 juniors and seniors.
W 3:35–5. S. Warland.
This seminar examines the role of listening in organizational contexts from a managerial perspective, discussing listening as a vehicle through which managers define and establish goals, engage and motivate workers, and perform other traditional management functions. Application to the newer schools of thought—particularly the symbolic/culture and human resources perspectives—will be emphasized.

COMM 496 Internship
Fall, spring, summer, and intersession. 1–3 credits. Students must apply no later than the spring pre-course enrollment period for a fall internship or the fall pre-course enrollment period for a spring or summer internship. Prerequisites: communication junior or senior, 3.0 average in communication courses, and approval of instructor. S-U grades only.
Arranged. Staff.
Structured, on-the-job learning experience under supervision of communication professionals in a cooperating organization. Maximum of 6 credits total may be earned; no more than 3 per internship but flexibility allows 6 for 1 credit each, 3 for 2 credits each, or 2 for 3 credits each. Internships must be approved in advance and must be supervised by a communication professional in fields of public relations, advertising, publishing, or broadcasting. Limited to communication majors. Minimum of 60 on-the-job hours per credit required.

COMM 497 Independent Study
Fall or spring. 1–3 credits; may be repeated to 6 credits with a different supervising faculty member. Prerequisite: 3.0 cumulative average. Students must register with an Independent Study form (available in 140 Roberts Hall).
Staff.
Group or individual study under faculty supervision. Work should concentrate on locating, assimilating, synthesizing, and reporting existing knowledge on a selected topic. Attempts to implement this knowledge in a practical application are desirable.

COMM 498 Communication Teaching Experience
Fall or spring. 1–3 credits; may be repeated to 6 credits with different courses. Limited to juniors and seniors. Intended for undergraduates desiring classroom teaching experience. Prerequisite: 3.0 cumulative average (2.7 if teaching assistant for a skill development course) and permission of the faculty member who will supervise the work and assign the grade. Students must register with an Independent Study form (available in 140 Roberts Hall).
Hours to be arranged. Staff.
Periodic meetings with the instructor cover realization of course objectives, evaluation of teaching methods, and student feedback. In addition to aiding with the actual instruction, each student prepares a paper on some aspect of the course.

COMM 499 Independent Research
Fall or spring. 1–3 credits; may be repeated to 6 credits. Limited to seniors and graduate students. Prerequisite: 3.0 cumulative average. Students must register with an Independent Study form (available in 140 Roberts Hall).
Staff.
Permits outstanding students to conduct laboratory or field research in communication under appropriate faculty supervision. The research should be scientific: systematic, controlled, empirical. Research goals should include description, prediction, explanation, or policy orientation and should generate new knowledge.

COMM 610 Seminar in Organizational Communication
Spring. 3 credits. Open to seniors with permission of instructor.
T R 12:20–2:15. D. Schwartz.
Study of the psychology of interpersonal communication in organizations. Methods for analyzing communication structure and processes, including communication audits and network analysis.

COMM 611 Human Communication in Organizations
Spring. 3 credits. Prerequisite: Graduate or senior status and permission of instructor.
M 1:25–4:25. S. White.
Experiential course focuses on the individual's need to reflect on experiences with interpersonal, intra group communication processes to understand the role in an organization. Concepts and variables critical to participatory organizational operations, renewal and change. Experiences are grounded in theory and research, relevant to understanding human behavior and communication in organizational contexts.

COMM 612 Intercultural and Development Communication
Fall. 3 credits.
T 1:25–4:30. N. E. Awa.
The course traces the imprint of culture in its effects on communication between people and groups from different backgrounds and assesses the role of communication in programs of social change and development. The first part of the course deals with perception, language, beliefs, attitudes, and world view (or what we bring to intercultural transactions) from a multidisciplinary social science perspective. The second part focuses on communication (interpersonal, and mass and traditional media) in technology transfer in agriculture, education, family planning, nutrition, and the like. The subtleties and complexities of nonverbal codes as well as barriers to listening in intercultural trade and business are also broached.

COMM 616 Interpersonal Communication
Spring. 3 credits. Limited to graduate students in communication; others by permission of instructor.
M W 10:10–12. N. E. Awa.
The seminar explores foundational theories and principles of interpersonal communication as well as theories and methods in the newly emerging area of social cognition. Together, these groups of theories seek to explain human communicative behavior in a variety of settings through understanding of the cognitive processes and mental activities that undergird such behavior. In addition to theory, students will engage in experiental learning activities designed to provide balance between principles and practice. Topics covered include: the nature, structure, and functions of interpersonal communication; expectancy formation and development; stereotyping and attribution; perception, attention and memory; and the cognition-behavior relationship.

COMM 620 Public Opinion and Communication
Fall. 3 credits. Graduate students and advanced undergraduates.
M 11:15–2:15. C. Glynn.
The impact of public opinion on society and the individual and the effects of communication on public opinion. Public opinion is examined from theoretical, applied, and methodological perspectives incorporating readings from political science, sociology, marketing, social psychology, and communication. Analysis and interpretation of public opinion polls. Investigation of trends in public opinion on specific issues.

COMM 624 Communication in the Developing Nations
Spring. 3 credits. Open to seniors.
Lec, M 1:25–4:25. R. D. Colle.
An examination of existing communication patterns and systems and their contributions to the development process. Attention is given to the interaction between communication systems and national development in primarily agrarian societies.

COMM 625 Communication for Social Change
Summer only. 3 credits. Fee: $50.00.
T R 9:00–1:00. Staff.
A survey of international communication problems and perspectives on social change, with a special focus on the so-called Third World. Concentration on critical issues of communication policy and planning at local, national, and international levels. Extensive use of case studies.

COMM 626 Impact of Communication Technologies
Spring. 3 credits. Open to seniors. Offered alternate years.
W F 12:20–2:15. P. Yarbrough.
A study of emerging technologies of communication, such as computer-based information systems and satellites and their potentials for influencing communication processes and social systems. Also examines the impacts of previous communication innovations from cave painting to television.

COMM 640 Social Design of Communication Systems
Spring. 3 credits. Prerequisite: permission of instructor. S-U grades optional.
T 12:20–3:20. G. Gay.
Course will focus on the design of computer interfaces and software from the user's point of view. The goal is to teach user interface designs that "serve human needs" while building feelings of competence, confidence, and satisfaction. Topics include formal models of people and interactions, ergonomic concerns, psychological and philosophical design considerations, and cultural and social issues.

COMM 665 Scientific Writing for Scientists
Summer only. 3 credits. Prerequisites: research in progress and permission of instructor.
T R 8:30–9:55. Staff.
Workshop for students with research in progress. Discussion and lectures on writing a journal article, thesis, report, and proposal; on objectives in scientific writing, relation of rhetoric and linguistics to scientific writing, process of publication and reviewing, and preparation of tables and illustrations; and on advanced and special problems in organization, paragraph development, sentence structure, and usage.

COMM 666 Perspectives on Science Writing
Fall. 3 credits. Open to graduate students and advanced undergraduates (with permission) from all departments.
M W 2:30–4. B. Lewenstein.
A graduate reading course that surveys the approaches that scholars have used to understand science communication, with special emphasis on scientific information intended for nonscientists. Among the perspectives are history, sociology, journalism, risk communication, agricultural communication, literature, and philosophy.

COMM 676 Communication Planning and Strategy
Spring. 3 credits. Primarily for graduate students but open to seniors.
T R 10:10–12. C. Scherer.
Seminar in the planning of communication activities for the support of directed social-change programs. Examines communication and social theories, case studies, and planning models. Participants produce a comprehensive communication plan designed to solve a significant (real) communication problem. Case studies and discussion focus on communication problems from nutrition and health, rural development programs, marketing, nonformal education programs, and corporate and government public information campaigns.

COMM 680 Studies in Communication
Fall. 3 credits. Limited to graduate students in communication; others by permission of instructor.
M 9:05–11. Lab to be arranged.
R. Ostman.
A review of classical and contemporary research in communication, including key concepts and areas of investigation. An exploration of the scope of the field and the interrelationships of its various branches.

COMM 681 Seminar in Psychology of Communication
Spring. 3 credits. Prerequisite: graduate students in communication; others by permission of instructor.
Lecs, T 3:35–4:30 and R 2:30–4:25.
M. Shapiro.
An introduction to theory and research in the mental processes of the communicating individual. Discussions and readings will include how individuals process and remember communication information, how communication information is used in decision processes, how motivation influences processing of mass communication information, and how attitudes form and change.

COMM 682 Methods of Communication Research
Fall. 3 credits. Limited to graduate students.
W F 10:10–11:25. M. Shapiro.
An analysis of the methods used in communication research. Emphasis on understanding the rationale for survey, textual, experimental and ethnographic research methods.

COMM 683 Quantitative Research Methods in Communication
Spring. 3 credits. Prerequisite: Communication 682 or equivalent.
Lec, M 12:20–3:30. D. McDonald.
Practical experience in quantitative social science research techniques. Course topics include design and measurement, data collection, data preparation, data analysis and hypothesis testing, and interpretation of results. Secondary analyses of available data sets are conducted within each topic area. The course provides an introduction to the use of several common statistical software packages.

COMM 684 Qualitative Methods in Communication Research
Spring. 3 credits.
W 12:20–3:30. B. Lewenstein.
This course explores the nature of communication research and the place of qualitative methods in that research. Through readings, discussions, and papers, students will examine the various techniques of qualitative research, gaining both an introduction to those methods and an appreciation of when those methods are appropriate for attacking particular issues in communication.

COMM 685 Training and Development: Theory and Practice (also Education 685, International Agriculture 685 and Industrial and Labor Relations 658)
Spring and summer. 4 credits. S-U grades optional. Charge for materials, $45.
Lec, F 9:05–12:05; lab, 1 hour per week, to be arranged. R. Colle, M. Ewert, W. Frank.
Analysis, design, conduct, administration, and evaluation of training programs for the development of human resources in small-farm agriculture, rural health and nutrition, literacy and nonformal education, and general community development. Designed for scientists, administrators, educator-trainers, and leaders of national and local rural and agricultural development programs. Materials focus on programs in the U.S. and abroad, with somewhat greater emphasis on "developing" nations.

COMM 688 Participatory Communication and Research for Development
Summer only. 2 credits. Fee: $50.00.
M W F 9–1:30. Staff.
An exploration of the conceptual framework and value orientation needed to build participatory practices into development research and agricultural extension, development, and social action programs. Popular and alternative communication approaches for participatory development are analyzed.

COMM 693 Topics in Communication
Fall. No credit. S-U grades only.
Lec, hours to be arranged. Staff.
Scholars from a wide variety of fields will present theory or research as it relates to communication.

COMM 694 Seminar in Research Planning
Spring. No credit. S-U grades only.
Lec, hours to be arranged. Staff.
Graduate students will present thesis (project) proposals to faculty and peers.

COMM 792 Advanced Communication Studies
Fall or spring. 3 credits. Limited to communication graduate students. May not be repeated. Students must use the faculty member's section number to register.
Graduate faculty.
Independent studies and projects are carried out in conjunction with selected undergraduate courses.

COMM 794 Seminar in Communication Issues
Fall, spring, or summer. 1–3 credits.
Prerequisite: permission of instructor.
Hours to be arranged.
Small group study of topical issue(s) in communication not otherwise examined in a graduate field course.

COMM 797 Graduate Independent Study
Fall, spring, or summer. 1–3 credits.
Prerequisite: permission of instructor.
Hours to be arranged.
Individual study concentrating on locating, assimilating, synthesizing, and reporting existing knowledge on a selected topic.

COMM 798 Communication Teaching Laboratory
Fall and spring. 1–3 credits each semester. May be repeated once. Limited to graduate students. Prerequisite: permission of the faculty member who will supervise the work and assign the grade. Students must use the faculty member's section number to register.
Graduate faculty.
Designed primarily for graduate students who want experience in teaching communication courses. Students work with an instructor in developing course objectives and philosophy, planning, and teaching.

COMM 799 Graduate Research
Fall, spring, or summer. 1–3 credits. Prerequisite: appropriate communication graduate course work or permission of instructor.
Hours to be arranged.
Small-group or individual research based on original, empirical, data-based designs regarding topical issues in communication not otherwise examined in a graduate field course.

COMM 899 Directed Graduate Study
Fall or spring. 3–6 credits. S-U grades only. Students must use the faculty member's section number to register.
Graduate faculty.

EDUCATION

R. E. Ripple, chair; A. L. Berkey, W. S. Carlsen, J. Confrey, D. Deshler, W. E. Drake, J. A. Dunn, J. R. Egner, D. M. Ewert, J. H. Gould, E. J. Haller, D. E. Hedlund, J. McGonigal, J. Millman, D. H. Monk, J. D. Novak, S. Piliero, G. J. Posner, D. E. Schrader, K. A. Strike, H. D. Sutphin, D. J. Trumbull

EDUC 005 Basic Review Mathematics
Fall. 3 credits (this credit is not counted toward the 120 credits required for the degree). Primarily for entering students.
Fall: M W F 9:05. S. Piliero.
Introduction to concepts necessary for success in EDUC 115 and basic statistics courses. Topics include problem solving, ratios and proportions, factoring and solving algebraic equations, graphing linear and quadratic equations, and trigonometry. Considerable emphasis is placed on learning to learn mathematics for understanding and on comprehending word problems.

EDUC 115 Introductory College Mathematics
Fall or spring. 4 credits.
Lecs, M W 11:15 or 12:20; labs, R 8–9:55, 10:10–12:05, 12:20–2:15, 2:30–4:25, or F 8–9:55, 10:10–12:05, 12:20–2:15. S. Piliero.
Designed to give students with sound high school mathematics backgrounds a unified treatment of the basic concepts of college algebra, trigonometry, and geometry. Considerable emphasis is placed on the concept of function, graphing, problem solving, and applications. Selected software is used to strengthen and integrate the mathematical topics covered.

EDUC 120 Education for Empowerment
Spring. 1–3 credits.
T R 2:30–4. M. Ewert, J. Egner, J. Dunn.
A modular course, with each module spanning 5 weeks for 1 credit. Common themes running through the modules include human learning, teaching strategies, political/social/economic factors affecting education. The course provides an opportunity to sample different areas of study and to gain knowledge and awareness of one's own educational processes.

EDUC 210 Psychology of Learning and Memory
Fall. 3 credits. Prerequisite: introductory psychology.
M W F 10:10. J. A. Dunn.
This course deals with contemporary theories of learning, issues in the study of learning, and application of the principles of learning to the management of teaching and learning. Practical applications of research findings will be emphasized. One or more experimental projects and the use of microcomputers will be required. Not acceptable as a substitute for Education 311.

[EDUC 211 Psychology of Individual Differences
Fall. 2–3 credits. S-U option available. Offered odd-numbered years. Not offered 1992–93.
M W F 12:20. J. A. Dunn.
An introductory course focused on basic concepts in the psychology of individual differences applicable to the teaching/learning process. Topics include: intelligence, personality, motivation, cognition, memory, psychological testing, and measurement.]

EDUC 212 Psychological Foundations of Education
Fall. 2–3 credits. S-U option available. Offered even-numbered years.
M W F 12:20. J. A. Dunn.
A lecture/discussion survey of the psychological foundations of educational practice. Topics include the selective contributions of developmental, social, and experimental psychology, including instructional technology, to American education.

EDUC 240 The Art of Teaching
Fall and spring. 3 credits.
Lec. Fall: T 2:30–4:25; spring: T 2:30–4:25 or W 2:30–4:25. 2-hour fieldwork to be arranged. Enrollment limited. Not open to freshmen. J. R. Egner, G. J. Posner, D. J. Tumbull, and staff.
This course is designed for all students interested in finding out more about teaching. Students engage in field experiences to find out what teaching involves. Possible field experiences range from large group to tutorial situations, from preschool to adult education, from traditional school subject matters to recreational and vocational areas, and from school-based to nonformal situations. Class work builds on those experiences and provides skills and concepts to make the field experiences more profitable.

EDUC 247 Instructional/Informational Application of Microcomputers and Related Technologies
Spring. 2–3 credits. Not available to students who have completed ABEN 102 or NR 107.
R 2:30–3:20; lab to be arranged.
H. D. Sutphin.
This course provides an introduction to instructional/information applications and strategies for using microcomputers and related technologies in public and private education and in the private sector. The course also helps students learn to use technologies to enhance their college studies. Wordprocessing, spreadsheets, databases, hypertext, electronic bibliographical searching, networking, and desktop publishing are covered. Module A (1 credit) is the first seven weeks of the semester, focused on Macintosh technology. Module B (1 credit) is the second seven weeks, focused on IBM-compatible and related technologies. For Module C (1 credit) students propose and complete an approved special project related to the class.

EDUC 271 Sociology of Education
Fall. 3 credits. Limited enrollment. S-U grades optional.
T R 10:10–11:30. E. J. Haller
An introduction to the sociological study of schooling and education. Topics include the effects of social factors on educational achievement, the norms and values learned as part of the process of schooling, the relations between students and teachers, and the school's relations to the economic and political systems. All levels of education, from elementary school to the university, are considered.

EDUC 301 Knowing and Learning in Science and Mathematics
Fall. 3 credits. Prerequisite: enrollment in science/mathematics certification program or permission of instructor.
W F 2:30–4:25. D. J. Trumbull.
Students examine both current notions in the history and philosophy of science that explain how knowledge within a discipline develops and current theory and research that examines the individual's acquisition of knowledge. This material serves as a basis for students to conduct clinical interviews under the direct supervision of program staff. During the course students examine their own understanding of their major as the first step in their preparation as teachers.

EDUC 302 Observing Science and Math Instruction
Spring. 3 credits. Prerequisite: enrollment in a teacher education program or permission of instructor.
Lec, W 2–4:25. W. S. Carlsen and A. Solomon.
The study of a variety of methods for recording and understanding science and mathematics teaching and learning. By reading and conducting research from a variety of analytic/interpretive paradigms, students will approach the familiar world of the secondary classroom with fresh perspectives. The course will include a final project that involves observing and evaluating a case of teaching. Students enrolled in teacher education programs will be expected to focus on their own teaching for the final project.

[EDUC 310 Psychology of Instructional System Design
Fall. 2–3 credits. Prerequisite: EDUC 210 or permission of instructor. Not offered 1992–93.
M W 11:15, hour to be arranged.
J. A. Dunn.
The course reviews the relevance of theories of learning and issues in the study of learning to the technology of instruction. Various examples of instructional systems will be considered. Student projects and laboratory exercises will be required.]

EDUC 311 Educational Psychology
Fall or summer. 3 credits. Prerequisite: introductory psychology. S-U grades optional in fall; letter grade only in summer.
Fall: M W F 11:15. D. E. Schrader.
Summer: TBA. J. A. Dunn.

An introductory survey course. Emphasis is on human learning and the educational process from a psychological point of view. The course is set in a broadly based teaching-learning context appropriate for prospective teachers, youth group leaders, community leaders, and those in the service-helping professions.

EDUC 312 Learning to Learn
Spring. 3 credits. Prerequisite: one or more courses in psychology or educational psychology
T R 9:05. J. D. Novak.
This course is intended for persons interested in the improvement of their learning strategies and the application of new ideas and methods to improve educational programs. Lectures and discussions are based on assigned readings and the contributions of class members. The major focus of the course is how and why concepts play a central role in human learning. Concept mapping and other strategies for educating will be used. Students will apply principles and methodologies in a project related to their interests.

EDUC 317 Psychology of Adolescence
Spring. 3 credits. Prerequisite: introductory psychology. S-U grades optional.
M W F 11:15. D. E. Schrader.
This course surveys the nature of adolescent cognitive, social, moral, and self-development. Theories of adolescence are examined in the context of real-life experiences of adolescents using case analysis as a methodological tool. Educational implications will be discussed for both formal and informal settings.

EDUC 331 Careers in Agriculture, Extension, and Adult Education
Fall. 1–3 credits. Letter grade only.
Lec, M 2–4:25; lab to be arranged.
D. Deshler, D. Foster, and J. Gould.
This course will offer modules in three areas of teaching: Adult Education, Cooperative Extension, and Agricultural Education. Each module will offer one hour of credit, and students may take one or more of the modules. The course will provide a historical perspective and an introduction to the organization and scope of programs for each module. Students will examine career opportunities and characteristics of the professions addressed by each module. Course activities include field observations and experiences during arranged times.

EDUC 332 Instructional Methods in Formal and Non-formal Education
Spring. 3 credits.
M 2–4:25 and F 12:20–1:10. A. Berkey, J. Gould.
Selection, practice, and evaluation of methods in formal and non-formal education will be stressed. The course will focus on both general teaching strategies and methodology unique to teaching in schools and non-formal settings. Course activities include micro-teaching and field experience during arranged times.

EDUC 335 Youth Organizations
Spring. 3 credits. Prerequisite: introductory psychology or permission of instructor.
Lecs, T R 10:10; lab to be arranged
J. H. Gould.
The role of selected youth organizations in providing educational experiences for youth. Factors affecting membership, purposes, design, operation, and administration are surveyed, emphasizing the roles an adult volunteer leader may play. The course is designed to give students an in-depth, learning-by-doing experience of how youth organizations function. Field experience with a recognized youth organization is required.

EDUC 352 Reading Statistics
Fall or spring. 1 credit. Prerequisite for spring: concurrent registration in EDUC 353.
Fall: T 12:20; spring: T R 8:30–9.
J. Millman.
An introduction to statistical vocabulary and symbolism frequently used in reporting empirical research in education and other social sciences. Students are taught how to comprehend statistical terminology and results.

EDUC 353 Introduction to Educational Statistics
Spring. 3 credits. Enrollment limited to 40 students. Prerequisite: EDUC 352 or concurrent registration, or permission of instructor.
T R 9:05–11. J. Millman.
A study of common univariate and multivariate statistical procedures encountered in educational and psychological inquiry. Meaning of concepts and mastery of course content is emphasized; computational details are not. Microcomputers are used extensively in class to develop understanding of the properties of statistical indices.

EDUC 370 Issues in Educational Policy
Spring. 3 credits.
T R 10:10–11:30. K. A. Strike.
An examination of selected policy issues in current education. Included are such topics as equality of educational opportunity; student, parent, and teacher rights; and educational politics. Issues are treated from legal, sociological, and economic perspectives.

EDUC 378 Political Economy of Education
Fall. 3 credits. S-U grades optional.
T R 12:20–2. D. H. Monk.
A policy oriented examination of educational systems with an emphasis on political and economic perspectives. Attention will be paid to both external and internal aspects of educational activities. Specific topics will include the changing contributions of education to earnings, school-community relations, power within educational organizations, the impact of technology in the workplace and in classrooms, and the sources and impact of educational costs. A variety of education settings will be examined including higher education and non-formal education.

EDUC 380 Independent Honors Research in Social Science
Fall or spring. 1–6 credits. Limited to students who have met requirements for the honors program. S-U grades optional. A maximum of 6 credits may be earned in the honors program.
Staff.

EDUC 401 Our Physical Environment
Fall or spring. 3 credits. Prerequisite: permission of instructor. Charge for photo supplies, approximately $7.
T 1:25–4:25. V. N. Rockcastle.
A practical, relatively nonmathematical study of some basic relationships and physical interactions in the environment, with emphasis on physics and earth science. Attention is paid to analysis for understanding and techniques for teaching. An individual research project is included. Useful for teachers and environmental educators.

EDUC 411 Introduction to Educational Measurement
Fall. 3 credits.
T 9:05–11, R 9:05–9:55. J. Millman.
Presents practices and theories of the measurement of human knowledge and performance. Students will be expected to acquire the practical skills of planning and constructing tests for a variety of purposes, interpreting and using test results, evaluating commercially available instruments, and the like. Students will also be expected to discuss intelligently a myriad of social, ethical, legal, and technical issues associated with educational testing. One course in statistics or concurrent registration in Education 352 is recommended but is not required.

EDUC 413 Psychology of Human Interaction
Fall. 3 credits. Enrollment limited. Prerequisite: permission of instructor. Fee, $5.
T R 10:10–12:05. D. E. Hedlund.
Designed to develop skills for, and understanding of, effective interpersonal communication and interaction. Appropriate for students in the helping professions, education, and areas involving management of human resources.

EDUC 414 Counseling Psychology
Spring. 4 credits. Limited to 30 students. Prerequisites: introductory psychology, social or personality psychology, and EDUC 413.
T R 10:10–12:05. D. E. Hedlund.
The processes of counseling are examined from various theoretical perspectives. Typical adult counseling issues are examined, and implications are drawn for counseling strategies with an adult population, including psychological assessment, establishing therapeutic goals, intervention strategies, and evaluation of outcomes. Alternative models of service delivery, such as outreach, consultation, and psychoeducation, are emphasized.

EDUC 420 Field Experience
Fall or spring. 1–4 credits. S-U grades optional. Undergraduates must attach to their course enrollment material written permission from the faculty member who will supervise the work and assign the grade.
Staff.
Students may engage in planned, semiprofessional, or professional practice in an educational enterprise. Each student prepares a plan of action including rationale, purposes, and procedures and arranges with a faculty member to supervise and evaluate the field experience.

EDUC 430 Special Problems in Agricultural Education
Fall, spring, or summer. 1–3 credits. S-U grades optional.
Fall and summer: hours to be arranged; spring: T 8. H. D. Sutphin.
An opportunity to study individually selected problems in agricultural education.

EDUC 432 Teaching Agriculture: Methods, Materials, Practice
Fall. 9 credits. Prerequisites: EDUC 332 and concurrent registration in EDUC 430 and 497.
M T W R F 8–3. A. L. Berkey and staff.
Directed participation in teaching agriculture at the secondary school level. Program includes a four-day intensive on-campus period and periodic seminars addressing selected methods and materials in teaching agriculture, combined with a 14-week period in a student teaching center. Includes evaluation of area resources, instructional

materials and facilities, planning and executing instruction, directing work experience, and advising youth organizations.

EDUC 445 Curriculum Design Workshop
Fall. 3 credits.
T R 10:10–11:30. G. J. Posner.
A general practical approach to course planning. Readings, group discussions, workshops, and individual conferences centering on each student's project. This project consists of designing a course in a subject area for an age level and an institutional setting of the student's choosing.

EDUC 457 Discourse Analysis
Fall. 2 credits. Offered alternate years.
Lec, T R 2:30. W. S. Carlsen.
An introduction to the sociolinguistics of education. In the context of classrooms and schools, we will consider among other issues the relationship between social status and talk, questioning, the negotiation of meanings in lessons, and the theoretical and empirical challenges of recording, transcribing, and analyzing conversations and interviews.

EDUC 472 Philosophy of Education
Fall. 3 credits.
T 2:30–4:25. K. A. Strike.
A study of central issues in the philosophy of education. Questions of ethics, political philosophy, and the theory of knowledge are examined and linked to current educational issues.

EDUC 475 Epistemology and Teaching
Spring. 3 credits. Letter grade only.
T R 3:30–4:45. K. A. Strike.
This course emphasizes the critical examination of recent debates in philosophy of science concerning the nature of scientific knowledge and scientific inquiry. It applies these inquiries to such questions as the organization of curricular materials, the nature of effective science teaching, and the role of scientific knowledge in the deliberations of a liberal democracy.

EDUC 477 Law and Educational Policy
Fall. 3 credits.
M 2:30–4:25. K. A. Strike.
A study of recent federal court decisions concerning education. Emphasis on examining legal issues against a background of related educational issues and in terms of the consequences of legal decisions for the development and operation of educational institutions.

EDUC 481 Educating for Community Action
Fall. 3 credits.
M 1:25–4. M. Ewert.
The design and execution of educational aspects of community-action and nonformal education programs. Deals with the identification and statement of educational goals, selection of teaching strategies, and evaluation of outcomes.

EDUC 483 Comparative Studies in Adult Education
Spring. 3 credits. S-U grades optional.
W 7:30–10:30 p.m. D. Deshler.
Focuses on the variety of adult-education programs in countries around the world. Literature on comparative adult education, international conferences on adult education, UNESCO adult-education publications, and international community development are analyzed in relationship to each student's exploration of adult education in two countries. Description of adult education in other countries is shared by international students.

EDUC 492 Contemporary Issues in Psychology of Environmental Education
Spring. 2 credits. S-U grades optional. Offered even-numbered years.
M W F 12:20. J. A. Dunn.
A survey of theory and research in environmental psychology. Issues arising from environmental education and production efforts will be considered. Topics include: energy conservation, pollution control, recreational use of national parks and wilderness areas, habitat destruction, the psychology of environmental activism, etc. Student projects, reports, and oral presentations will be emphasized.

EDUC 497 Independent Study
Fall or spring. 1–3 credits. S-U grades optional. Students must register with an Independent Study form (available in 140 Roberts Hall).
Staff.
A student may, with approval of a faculty adviser, study a problem or topic not covered in a regular course or may undertake tutorial study of an independent nature in an area of educational interest.

EDUC 498 Undergraduate Teaching
Fall or spring. 1 or 2 credits; 4 credits maximum during undergraduate career. Limited to students with grade-point averages of at least 2.7. S-U grades optional. Students must register with an Independent Study form (available in 140 Roberts Hall).
Staff.
Participating students assist in teaching a course allied with their education and experience. Students are expected to meet regularly with a discussion or laboratory section, to gain teaching experience, and regularly to discuss teaching objectives, techniques, and subject matter with the professor in charge.

EDUC 499 Undergraduate Research
Fall or spring. 6 credits maximum during undergraduate career. Not open to students who have earned 6 or more undergraduate research credits elsewhere in the college. Limited to juniors and seniors with grade-point averages of at least 2.7. Students must register with an Independent Study form (available in 140 Roberts Hall).
Staff.
Affords opportunities for students to carry out independent research under appropriate supervision. Each student is expected to review pertinent literature, prepare a project outline, conduct the research, and prepare a report.

EDUC 501 Communication Workshop
Summer and intersession. 2 credits. S-U grades optional.
Lecs, M–F 9–12 and 1–4. Class meets six hours a day for five days. M. D. Glock.
The course focuses on skills enabling individuals to cope with such concerns as motivation, dealing with difficult persons, criticizing productively, improving comprehension, adjusting to different learning styles, and communicating with the public. Practice is coordinated with theory and research findings. The ongoing dynamics of the course necessitate intense participation over a period of time, not provided by regularly scheduled fifty-minute class periods. Additional auto-tutorial lab time is scheduled. Appropriate for anyone who works with people.

EDUC 513 Interpersonal Interaction
Summer. 1–2 credits.
1-week course. Hours to be arranged.
D. Hedlund.
Designed to develop skills for an understanding of effective interpersonal communication and interaction. Appropriate for students in the helping professions, education, and areas involving management of human resources. A workshop design is required for the second credit. Participants must bring a tape recorder to class.

EDUC 547 Improvement of College Teaching
Summer. 2 credits.
1-week course, hours to be arranged.
J. D. Novak.
Concepts of teaching, learning, curriculum, and governance are used to guide practical activities that enhance faculty competence. Recent studies of concept mapping and learning, structure of knowledge, science teaching, adult learning, and evaluation provide a conceptual basis for improving teaching.

EDUC 590 Special Topics in Education
Fall, spring, or summer. 1–3 credits. Prerequisite: permission of instructor. S-U grades optional. Hours to be arranged.
Staff.
Topics to be announced.

EDUC 601 Secondary Science and Mathematics Teaching Practicum
Fall or spring. 3 credits. Prerequisite: permission of instructor. Letter grades only. For graduate students enrolled in the Teacher Education in Science and Mathematics Program.
M T W R F 8–3. W. S. Carlsen and staff.
Supervised student teaching in science or mathematics at the secondary level. Program includes teaching at a local school for ten weeks.

EDUC 602 Teaching Science/Mathematics: Methods, Materials, Practice
Fall. 9 credits. Prerequisite: concurrent enrollment in EDUC 601 or permission of instructor.
Lec, M F 9–12 and 1–3, first 5 weeks; last 10 weeks to be arranged. W. S. Carlsen and staff.
The course begins with five weeks of intensive consideration of theoretical frameworks relevant to all aspects of student teaching. Assignments and a weekly seminar during the next ten weeks require students to use those theories to develop and evaluate teaching materials and practices. Students will complete an extensive portfolio documenting their work.

[EDUC 603 Teaching Mathematics
Spring. 3 credits. Offered alternate years. Not offered 1992–93.
T R 10:10–11:25. J. Confrey.
Current research in mathematics education will be examined in order to develop a picture of the mathematics classroom that integrates subject matter, student conceptions, affective variables, and issues in the social context of learning mathematics. Special topics will include research on problem solving, women and mathematics, misconceptions, and research on teaching.]

[EDUC 606 Seminar in Science and Mathematics Education
Fall. 1 credit. S-U grades only. Not offered 1992–93.
R 4:30. Staff.
Explores topics in science and mathematics education. The focus of the seminar changes each year.]

EDUC 609 Educational Ethnography
Spring. 3 credits. Prerequisite: course in research methods or measurement or permission of instructor.
M W 2:30–4. D. J. Trumbull.
The course will study educational ethnography as a form of interpretive research, a perspective that attends to the complex interactions between researcher, researched, and context and accepts the centrality of meaning-making in the conduct of human affairs. Students will examine some of the philosophical debates about research approaches and will discuss research methods as they relate to the aims and assumptions of interpretive research. Students will conduct a joint research project during the course of the semester.

EDUC 611 Educational Psychology
Fall. 3 credits. Prerequisite: introductory psychology. S-U grades optional.
M W F 11:15. D. E. Schrader.
A basic survey course for graduate students. Emphasis on psychological factors involved in human learning and the educational process. Set in a broad-based conceptual model of any behavioral setting for learning. Appropriate for those seeking an introduction to educational psychology or a refresher course in contemporary educational psychology.

EDUC 613 Theory and Methods for Education
Fall. 3 credits. Prerequisite: EDUC 311 or 611 or permission of instructor.
T R 9:05. J. D. Novak.
Presents a coherent theory of education combining concepts from philosophy, psychology of learning, curriculum, and instruction. New educational methods, including concept mapping and clinical interviews, will be presented. Students will gain competence by applying concepts and methods in projects related to their interests. Classes include discussion of student-initiated questions and use of videotape to analyze educational techniques.

EDUC 614 Epistemological Development and Reflective Thought
Fall. 3 credits. Prerequisite: EDUC 611. S-U grades optional.
Lec, M 12:20–2:15; 1 hour to be arranged. D. E. Schrader.
Insight into how individuals make sense of knowledge is essential to teaching and learning. This course examines theories of intellectual development and their implications for educating students of various age groups, particularly college students. The role of reflection on thinking (metacognition) and its impact on development of thought is explored. Small groups on special topics will be formed and will meet informally throughout the semester.

[EDUC 615 Self and Interpersonal Development and Education
Spring. 3 credits. Prerequisite: EDUC 611. S-U grades optional. Offered even years. Not offered 1992–93.
Lec, M 12:20–2:15; 1 hour to be arranged. D. E. Schrader.
Interpersonal interactions affect teaching and learning. This course takes a life-span perspective as it explores constructive-developmental theories of self and others, and how such theories explain students' understanding of their own and others' actions in educational contexts. Small groups on special topics will be formed and will meet informally throughout the semester.]

EDUC 620 Internship In Education
Fall or spring. 2–6 credits. S-U grades optional. Each student, before course enrollment, must obtain the approval of a faculty member who will assume responsibility for supervising the work.
Staff.
An opportunity for practical experience in educational professions development.

EDUC 621 Work-Experience Coordinator Certification Course I
Summer. 3 credits. S-U grades optional.
2-week course. Hours to be arranged. A. L. Berkey.
The first of a two-course sequence designed to develop the competencies needed for certification as a coordinator of diversified cooperative work experience programs. The course focuses on the history and philosophy, types, operation, and evaluation of work-experience programs including articulation with JPTA and VESID. Field interviews are required. A prerequisite for Course II, EDUC 622.

EDUC 622 Work-Experience Coordinator Certification Course II
Summer. 3 credits. Prerequisite: EDUC 621 Work-Experience Certification Course I.
1-week M–F 8–5. Hours to be arranged. Internship - 3 wks. A. L. Berkey.
The second course for certification as a diversified cooperative work experience coordinator combines course work and directed field experience leading to the planning, development, and approval of a work-experience program in a local educational agency. Development of a philosophy and policy statement, budget, curriculum for related instruction, annual work plan by function, promotional materials, and all program forms for Board of Education approval required.

EDUC 630 Special Problems in Agricultural and Occupational Education
Fall or spring; may also be offered in summer. 1–3 credits. S-U grades optional.
Hours to be arranged. A. L. Berkey and staff.
The course provides an opportunity for graduate-level study of individually selected problems and issues in agricultural and occupational education. Designed for experienced teachers.

EDUC 632 Teaching Agricultural, Extension, and Adult Education
Spring. 3 credits. Prerequisite: an introductory course in teaching methods or permission of instructor.
M 8–10. A. L. Berkey.
The focus of the course is on the selection, use, and evaluation of methods and materials for teaching. Methods for group and informal instruction are covered. Opportunity is provided for students to develop teaching competence based on their individual needs and interests. Development of self-evaluation skills is included. A class project on the development of instructional materials is required.

[EDUC 633 Program Planning in Agriculture, Extension, and Adult Education
Fall. 3 credits. Field trip. Not offered 1992–93.
Lec, T 2–4:30; lab to be arranged. Staff.
Current social and economic conditions affecting agriculture, extension, and adult education are examined. Principles, objectives, strategies, and sources of information are applied to program planning. Participants have an opportunity to observe ongoing programs in agriculture, extension, and adult education, and to pursue individual interests in program development and improvement.]

[EDUC 644 Curriculum Theory and Analysis
Fall and spring. 3 credits. Not offered fall 1992.
T R 2:30–4. G. J. Posner.
An examination of the basic elements involved in making curriculum decisions and an analysis of current approaches to curriculum. The course focuses on the assumptions underlying any curriculum. The major task of each student is to choose and conduct an in-depth analysis of a curriculum. This course is the basic graduate course in curriculum.]

EDUC 647 Instructional Technologies: Analysis and Practices
Spring. 2–4 credits. Prerequisite: skills in statistics and research design. Letter grade only.
R 2:30–3:45; lab and seminars to be arranged. H. D. Sutphin.
Current research and literature on instructional computing and related technologies in the public and private sectors will be examined. Students complete a group research project on educational technologies and meet for five seminar sessions to earn 2 credits. The research experience includes design, data collection, input, analysis, and synthesis. Concurrent attendance in ED 247 Modules A and B is required (2 credits); or the modules may be taken as a prerequisite.

EDUC 650 Methods of Educational Inquiry
Fall. 1 credit.
T 2:30–3:20. D. J. Trumbull.
A survey of approaches to inquiry in the social sciences, including experimental and comparative designs, survey research, case study, simulation, philosophical and historical inquiry, content analysis, and secondary data analysis. The course is intended to broaden the student's views of appropriate methods of disciplined inquiry.

EDUC 651 Writing a Thesis Proposal
Fall. 1 credit. S-U grades only.
T 3:35. J. Millman.
Procedures for developing and writing a master's or doctoral thesis proposal. Emphasis will be given to identifying a significant topic, conducting and describing a group mini-research study, recognizing weaknesses in illustrative proposals, and clear and concise writing. Students will be provided ample assistance in constructing a brief thesis proposal of their own.

EDUC 659 Special Topics in Research Methods
Spring. 2–3 credits. Prerequisite: permission of instructor. S-U grades only.
Hours to be arranged. J. Millman.
Consideration of new techniques and current topics in educational research design, measurement, or evaluation of programs, products, and personnel.

EDUC 661 Administration of Educational Organizations
Fall. 3 credits.
W 3:35–6. E. Haller.
Perspectives on the administration of educational organizations. Consideration of social science, legal and ethical theories, and their application to both public schools and higher education. Intended for students who are considering careers as educational administrators, as well as for those who want to further their understanding of schools as organizations.

EDUC 664 Educational Finance
Fall. 3 credits. S-U grades optional.
R 3:35–6. D. H. Monk.
An analysis of the distribution and utilization of public and private resources for educational purposes. The discussion will revolve around the issues of equity, efficiency, and freedom of choice. Alternative methods of financing schools will be evaluated, and the perplexing legal and moral issues raised by such questions as "Who pays?" and "Who benefits?" will be discussed. Specific attention will be given to budgeting, accountability, and productivity. An opportunity for individuals to focus on their own areas of interest, such as occupational education, the two-year college, or secondary or higher education.

EDUC 665 Administrative Decision Making
Spring. 3 credits. S-U grades optional.
W 3:35–6. D. H. Monk.
An introduction to decision making theory and its relevance to the field of educational administration. Specific applications will be made to the study and improvement of productivity within educational systems. A wide variety of educational settings will be considered, including higher education and non-formal education.

EDUC 678 Planning Educational Systems
Spring. 3 credits. S-U grades optional.
T 2:30–4:25. D. H. Monk.
A seminar focused on a comparative analysis of educational planning as it is practiced in developing nations. Topics will include manpower planning, the social demand approach to educational planning, benefit-cost analysis, and incentive models of planning. The political and economic implications of attempts to plan education will be emphasized.

EDUC 679 Policy Issues in Higher Education
Spring. 3 credits. S-U grades optional.
T 11:15–1:15. J. R. Egner.
Deals with administration of higher educational organizations. Current approaches to planning and analysis of special problems.

EDUC 680 Foundations of Extension Adult Education
Fall. 3 credits. Limited to 20 students. S-U grades optional.
F 9:05–12:10. D. Deshler.
An analysis of alternative purposes, nature, and scope of extension, adult, and continuing education programs in the United States and abroad, with emphasis on the relationship of programs to historical, cultural, political, and social settings. Definitions, conceptual controversies, philosophical issues, and current research directions will be examined through a seminar approach.

[EDUC 681 Designing Extension and Continuing Education Programs
Fall. 3 credits. Prerequisite: permission of instructor. Not offered 1992–93.
T 1:25–4. Staff.
Designed to help students understand the concepts, principles, and procedures relevant to developing programs and curricula for the continuing education of adults. Emphasis is on such key areas as the nature and role of programming, situation analysis and needs identification, choosing among alternative courses of action, stating program objectives, and program organization.]

EDUC 682 Community Education and Development
Fall. 3 credits. For students who have interest or experience in education or development programs in which community is an important concern.
Lec, M 1:25–4. M. Ewert.
An examination of the concept of community; changes in community life; the analysis of community; alternative strategies for community development; patterns of response to community by universities, colleges, schools, cooperative extension, and government service agencies; and such functional dimensions of community education programming as participatory decision making, volunteers, leadership development, council formation and function, interagency coordination, and change-agents roles.

EDUC 683 Administration of Nonformal Education
Spring. 3 credits.
W 1:25–4. J. R. Egner.
An overview of selected theories, principles, and strategies applicable to management of decentralized, professionally staffed, nonformal educational organizations and change agencies. Content includes management functions, managerial leadership and decision-making strategies. Particular attention is given to leadership of organizations with volunteer staff.

EDUC 685 Training and Development: Theory and Practice (also Communication 685, International Agriculture 685 and Industrial and Labor Relations 658)
Spring. 4 credits. S-U grades optional. Charge for materials, $45.
F 9:05–12:05; lab/disc, once a week, to be arranged. R. Colle, M. Ewert, W. Frank.
Analysis, design, conduct, administration, and evaluation of training programs for the development of human resources in small-farm agriculture, rural health and nutrition, literacy and nonformal education, and general community development. Designed for scientists, administrators, educator-trainers, and social organizers in rural and agricultural development programs in the U.S. and abroad.

EDUC 690 Research Seminar
Fall and/or spring. No credit.
T 12:20. Staff.
Presentation of current research in the field of education by graduate students and staff. Opportunities to discuss methodology, findings, and other aspects of research.

EDUC 711 Contemporary Issues in Educational Psychology
Spring. 2–3 credits.
M W 11:15. 1 hour to be arranged.
J. A. Dunn.
This is a graduate-level seminar dealing with key issues in contemporary psychology having implications for educational practice and research. Topics will vary from year to year. Students may take the course more than once.

EDUC 714 Moral Development and Education
Spring. 3 credits. Prerequisite: EDUC 611. S-U grades optional. Offered odd-numbered years.
Lec, M 12:20–2:15; 1 hour to be arranged. D. E. Schrader.
This seminar focuses on current topics in moral development research as related to the educational process. Topics include the question of the development of moral reasoning, gender differences, the relationship between moral judgment and moral action, questions related to moral education in secondary schools and university settings, and professional ethics in educational settings. This course takes a life-span perspective; however, special emphasis will be placed on development from adolescence through adulthood.

EDUC 715 Seminar in Psychology and Education
Fall or spring. Variable credit. Prerequisite: permission of instructor.
R 1:25–3:30. D. E. Hedlund.
Selected topics focusing on the interaction of theoretical and research developments in psychology and education.

EDUC 718 Adult Learning and Development
Fall or spring. 3 credits. Prerequisite: permission of instructor. S-U grades optional. Offered alternate years.
W 2:30–5. J. D. Deshler and staff.
Deals with adult development and learning behavior from points of view of educational psychology, social psychology, and sociology. Inferences are drawn from theory and research to the practice of adult continuing education. Appropriate for graduate students in educational psychology, extension and continuing education, and community service education, and for others interested in adult learning and development.

EDUC 719 Seminar in Educational Psychology
Fall. 1 credit. S-U only.
F 12:20. D. Hedlund.
Presentation and discussion of current professional topics in educational psychology. Current research and theoretical controversies in the field will be covered.

EDUC 730 Seminar in Agricultural, Extension, and Adult Education
Spring. 2 credits. S-U grades optional.
R 8–9:55. H. D. Sutphin, J. R. Egner, and staff.
Emphasis on current problems and research in agricultural, extension, and adult education. Includes discussion and analysis of student and staff research.

EDUC 735 Teacher Preparation in Agriculture
Fall. 3 credits. Prerequisite: teaching experience in agriculture.
W 1:25–3:20. A. L. Berkey.
For persons with teaching experience interested in the preparation of occupational teachers. Involvement in the Cornell program of teacher preparation in agriculture is expected.

[EDUC 739 Evaluating Programs in Agriculture, Extension, and Adult Education
Spring. 3 credits. Field trip. Not offered 1992–93.
T 2–4:30; labs to be arranged. Staff.
This course examines objectives, criteria, and strategies for evaluating programs of agriculture, extension, and adult education. Evaluation models, case studies, and evaluation as a function of program planning are considered. Participants examine the roles of supervision in evaluation and have an opportunity to develop and apply evaluation instruments. Field trips and resource persons provide opportunities to observe actual evaluation problems and procedures.]

EDUC 744 Seminar in College Teaching
Summer. 2–3 credits.
1-week. Hours to be arranged. J. Novak.
This seminar will be specially designed for Latin college and university professors. It will begin with a review of the current status of knowledge on teaching and learning, presenting a theoretical foundation for education, and move to practice in solving specific teaching problems.

EDUC 745 Seminar in Curriculum Theory and Research
Spring. 3 credits. Prerequisite: EDUC 644, or permission of instructor.
W 8–11. G. J. Posner.
Theoretical issues in curriculum and appropriate areas for curriculum research are discussed. Two current topics of interest are the hidden curriculum and school reform. Both topics serve to uncover the relation between ideology and research.

EDUC 762 Research in Educational Administration
Spring. 3 credits. Prerequisite: one course in elementary statistics or permission of instructor. S-U grades only.
R 3:35–6. E. J. Haller.
For students interested in learning about the process of formulating and carrying out a piece of empirical research. Studies will focus on policy and administrative issues concerning public education. Seminar participants will have access to large, nationally representative data sets that will permit them to conduct high-quality, publishable studies of U.S. schools, students, teachers, and parents. In the process they will learn some of the costs and benefits of secondary data analysis and gain some familiarity with statistical analyses on a Cornell mainframe computer.

EDUC 772 Seminar in Philosophy of Education
Spring. 3 credits. Prerequisite: permission of instructor. S-U grades optional.
Hours to be arranged. K. A. Strike.
Topics to be announced.

EDUC 783 Comparative Extension Education Systems
Summer. 3 credits. S–U option.
1-week. Hours to be arranged. M. Ewert.
Extension education in the developing nations is studied using, as an analytical frame of reference, a hypothetical model comprising such components as community organization, community-based learning, indigenous facilitators and leaders, extension generalists and specialists, training and research-extension linkages. Case materials on alternative extension models and intercountry experiences provide an empirical base.

[EDUC 784 Educational Technology-Transfer and Decision Making
Fall. 3 credits. Offered odd years only. Not offered 1992–93.
M 12:20–2:15. H. D. Sutphin, J. McGonigal, and staff.
The educational and program management decisions involved in the adoption of educational technology in extension, rural development, and nonformal education programs are reviewed, and a variety of decision-making approaches is explored. An overall problem-solving method with case study illustrations is used. Consideration is given to structure and operating style of the educational organization, as well as to the characteristics of the technology under consideration. The course makes use of recent literature and continuously updated files on current developments in technology applications.]

EDUC 800 Master's-Level Thesis Research
Fall or spring. Credit to be arranged. S-U grades optional. Each student, before course enrollment, must obtain the approval of a faculty member who will assume responsibility for guiding the work.
Staff.

EDUC 900 Doctoral-Level Thesis Research
Fall or spring. Credit to be arranged. Limited to students working on theses or other research and development projects. S-U grades optional. Each student, before course enrollment, must obtain the approval of a faculty member who will assume responsibility for guiding the work
Staff.

Related Course in Another Department

Historical Roots of Modern Psychology (Psychology 490)

ENTOMOLOGY

Q. D. Wheeler, chair; P. L. Davis, G. C. Eickwort, P. P. Feeny, C. Gilbert, M. P. Hoffmann, J. K. Liebherr, R. A. Morse, L. A. Patrican, B. L. Peckarsky, D. Pimentel, R. B. Root, R. T. Roush, D. A. Rutz, J. P. Sanderson, J. G. Scott, E. J. Shields, M. J. Tauber, W. M. Tingey, S. Via

Emeritus professors: W. L. Brown, Jr., J. E. Dewey, J. G. Franclemont, W. T. Johnson, J. P. Kramer, A. A. Muka, C. E. Palm, R. L. Patton, E. M. Raffensperger, W. A. Rawlins, M. Semel, E. H. Smith, R. G. Young

Courses by Subject

Apiculture: 260, 264

Behavior: 471, 662

Ecology: 455, 456, 464, 470, 471, 664, 672

Introductory courses: 200, 212

Medical entomology and pathology: 352, 453, 454, 653

Morphology: 322

Pest management: 241, 342, 441, 444, 472, 640, 677

Physiology and toxicology: 370, 483, 685, 690

Systematics and acarology: 331, 332, 621, 631, 633, 634, 636, 674, 710

ENTOM 200 Cultural Entomology
Fall. 2 credits. S-U grades optional. Intended for students in all colleges.
Lecs, T R 10:10. E. M. Raffensperger.
A presentation of the insects, with attention to their roles in nature and in civilization. Biological, historical, social, economic, and cultural aspects are discussed.

ENTOM 212 Insect Biology
Fall. 4 credits. Prerequisites: BIO S 101–102 (may be taken concurrently) or equivalent.
Lecs, W F 11:15; lab, T W or R 1:25–4:25. J. K. Liebherr.
Introduces the science of entomology by focusing on basic principles of systematics, morphology, physiology, behavior, and ecology of insects. The laboratory in early fall includes field trips to collect and study insects in the natural environment. A small collection emphasizing ecological and behavioral categories is required.

ENTOM 241 Applied Entomology
Spring. 3 credits. Prerequisites: BIO S 101–102 or equivalent.
Lecs, T R 10:10; lab-disc, T W or R 12:20–3:15. R. T. Roush.
Introduction to major pest species and tactics for their management. Discussions of insect pest management requirements on farms, gardens, forests, and urban environments, along with descriptions of control methods, materials, and equipment.

ENTOM 260 Introductory Beekeeping
Fall. 2 credits.
Lecs,T R 11:15. R. A. Morse.
Introduces the fundamentals of practical beekeeping, including the life history, physiology, and behavior of honey bees. The classical experiments on the dance language and the role of pheromones are reviewed. Some lectures are devoted to pollination of agricultural crops and the production of honey and beeswax.

ENTOM 264 Practical Beekeeping
Fall. 1 credit. Limited to 20 students. Prerequisite: ENTOM 260 (may be taken concurrently).
Lab, R 2–4:25. R. A. Morse.
This course consists of fourteen laboratory sessions to acquaint students with practical methods of colony management. Laboratories involve actual work with honey bee colonies and equipment. Some of the topics covered are management of bees for apple pollination, honey harvesting and processing, and disease identification and control.

ENTOM 322 Insect Morphology
Fall. 5 credits. Prerequisite: ENTOM 212 or 241. Offered alternate years.
Lecs, M W F 9:05; labs, M F 1:25–4:25. G. C. Eickwort.
An introduction to the external and internal anatomy of insects, with emphasis on the comparative and functional aspects. The laboratory is devoted largely to dissection.

ENTOM 331 Introductory Insect Systematics
Spring. 4 credits. Prerequisite: ENTOM 212.
Lecs, T R 10:10; labs,T R 1:25–4:25.
Q. D. Wheeler.
An introduction to the classification, evolutionary history, and distribution of the insects. Laboratory practice in the identification of orders, families, and representative genera of insects; methods of collection, preservation, and study. Lectures on theory and practice of insect systematics and major features of insect evolution. Insect collections are required.

ENTOM 332 Systematics Discussion Group
Spring. 1 credit. Prerequisite: concurrent enrollment in ENTOM 331 or permission of instructor. S-U grades only. Offered alternate years.
Disc, hours to be arranged.
Q. D. Wheeler.
Readings and discussion on topics in systematics coordinated with the lecture series in Entomology 331.

ENTOM 342 Special Topics in Economic Entomology
Hours to be arranged.
Staff.
Topics to be announced.

ENTOM 352 Medical Entomology
Fall. 3 credits. S–U grades optional. Offered alternate years.
Lec, T R 10:10; lab, R 1:25–4:25.
L. A. Patrican.
The ecology of arthropods of medical and veterinary importance in temperate and tropical regions of the world with emphasis on the role they play in causation or transmission of disease. The laboratory involves 3–4 field trips, techniques of collection and identification, dissections, methods of transmission, means of identification of a blood pathogen and the source of a blood meal.

ENTOM 370 Pesticides, the Environment, and Human Health (also Toxicology 370)
Fall. 3 credits. Prerequisites: BIO S 101–102 or equivalent. Offered alternate years.
Lecs, T R 9:05; disc, 1 hr/wk to be arranged. J. G. Scott.
A survey of the different types of pesticides, their uses, properties, and effects on the environment. Discussion of the risks, benefits, regulation, politics, and current controversies associated with pesticide use.

[ENTOM 441 Seminar in Insect Pest Management
Spring. 1 credit. Limited to 15 students. Prerequisite: ENTOM 241 or 444 or permission of instructor. S-U grades only. Offered alternate years. Not offered 1992–93. Next offered 1993–94.
Hours to be arranged. M. P. Hoffmann, A. M. Shelton.
Discussion and analysis of current topics in insect pest management.

ENTOM 444 Integrated Pest Management (also Plant Pathology 444)
Fall. 4 credits. Prerequisites: BIO S 261, ENTOM 212 or 241, and PL PA 301 or their equivalents or permission of instructor.
Lecs, M W F 9:05; lab, M or W 1:25–4:25.
P. A. Arneson.
Lectures integrate the principles of pest control, ecology, and economics in the management of pest-crop systems. Laboratories consist of exercises to reinforce concepts presented in lecture and demonstrate pest monitoring techniques and the application of computer technology to management problems.

[ENTOM 453 Insect Pathology
Spring. 4 credits. Prerequisite: ENTOM 212 or 241 or permission of instructor. Recommended: a course in microbiology. Offered alternate years. Not offered 1992–93.
Lecs, M W 10:10; lab, R 1:25–4:25. Staff.
A survey of the diseases of insects caused by viruses, bacteria, fungi, and protozoans and a consideration of the role of microbial diseases in natural and applied insect control. Laboratory investigations center around living insect-pathogen associations and the consequences of these associations for both insect and microbe.]

[ENTOM 454 Insect Pathology Seminar
Spring. 1 credit. Prerequisite: ENTOM 453. S-U grades only. Offered alternate years. Not offered 1992–93.
Hours to be arranged. Staff.
Presentations, discussions, and analyses of current topics by the participants. Focus centers on microbial diseases of insects.]

[ENTOM 455 Insect Ecology, Lectures (also Biological Sciences 455)
Fall. 3 credits. Prerequisites: BIO S 261 and ENTOM 212 or their equivalents. Offered alternate years. Not offered 1992–93.
Lecs, W F 11:15 and 1 hour of discussion weekly to be arranged. R. B. Root.
Ecological and evolutionary principles are integrated by thorough examination of outstanding investigations. Topics discussed include the factors responsible for the great diversity of insects, adaptive syndromes associated with climate, natural history of arthropod guilds, impact of insects on terrestrial vegetation, population regulation, and the contrast between natural and managed ecosystems.]

ENTOM 456 Stream Ecology (also Biological Sciences 456)
Spring. 3 credits. Recommended: BIO S 261. S-U grades optional. Offered alternate years.
Lecs, T R 9:05; lab, T, W, or R 1:25–4:25 (3 sections). B. L. Peckarsky and C. M. Pringle.
Lecture will address the question—how does flow influence the structure and function of stream ecosystems? Aspects of structure include channel morphometry, physical and chemical gradients, and plant, invertebrate, and fish community structure. Functional analyses include nutrient cycling and downstream transport, trophic dynamics, processes affecting plant and animal colonization and succession, conservation and the impacts of anthropogenic disturbances. Lab: 3 class projects using descriptive, behavioral, and experimental techniques in the lab and the field to test hypotheses discussed in lecture.

[ENTOM 464 Microevolution and Macroevolution (also Biological Sciences 464)
Spring. 4 credits. Prerequisite: Biological Sciences 378 or consent of instructor. S-U grades optional with permission of instructor. Offered alternate years. Not offered 1992–93; next offered 1994. Limited to 25 students.
Lecs, T R 10:10–11:30; disc, 1 hr/wk to be arranged. A. McCune, S. Via.
An advanced course in evolutionary biology integrating macroevolutionary and microevolutionary approaches. Areas of emphasis include patterns and processes of speciation, phylogeny reconstruction in populations and higher taxa, the origins and fate of variation, and causes of major evolutionary transitions. Discussion of these problems will involve data and approaches from genetics, morphology, systematics, paleobiology, development, and ecology.]

[ENTOM 470 Ecological Genetics (also Biological Sciences 470)
Spring. 4 credits. Prerequisite: Biological Sciences 378 or consent of instructor. S-U grades optional. Offered alternate years. Not offered 1992–93. Next offered 1995.
Lecs, T R 10:10–11:30; disc, 1 hr/wk to be arranged. S. Via.
A study of the relationships between genetic and ecological processes in populations. Topics include consequences of genetic variation in age-structured populations, demographic concepts of fitness, evaluation of methods for measuring genetic variation and natural selection on ecologically important traits, genetics of competitive ability and predator avoidance, genetic and ecological aspects of phenotypic plasticity, character displacement, maintenance of genetic variability, and limits to selection. We will consider how theory can be used to formulate hypotheses about evolutionary mechanisms in natural populations and evaluate experiments designed to test such hypotheses.]

[ENTOM 471 Freshwater Invertebrate Biology
Spring. 5 credits. Recommended: ENTOM 212. Offered alternate years. Not offered 1992–93. Next Offered 1994.
Lecs, T R 9:05; labs, T R 1:25–4:25.
B. L. Peckarsky.
The lecture explores the morphology, physiology, phylogeny, life histories, behavior, feeding ecology, and evolution of macroscopic freshwater invertebrates with an emphasis on contrasting the attributes of aquatic and terrestrial insects. The laboratory involves field collections and laboratory identification of invertebrates and stresses the use of keys. Students prepare a collection of freshwater invertebrates.]

ENTOM 472 Genetics of Pest Management
Fall. 4 credits. Prerequisite: BIO S 281 or equivalent. S-U grades optional.
Lecs, T R 12:20–1:45; lab to be arranged (3 hours). R. T. Roush.
A detailed survey of the application of genetics to pest management. Includes discussion of host plant resistance, pesticide resistance, insect mass rearing technology, autocidal controls (e.g., sterile males), and the establishment and genetic improvement of biological control agents, with examples from plant pathology, weed science, and entomology.

ENTOM 483 Insect Physiology
Spring. 4 credits. Prerequisite: ENTOM 212 or permission of instructor.
Lecs, M W F 11:15; lab, W 1:25–4:25.
C. Gilbert.
An introduction to the often unique ways in which insects have met their basic needs. Each organ system is examined with emphasis on basic principles and specific examples. The student will also be introduced to some common methods used in physiological

research and to the critical reading of scientific literature.

ENTOM 497 Special Topics for Undergraduates
Fall or spring. Credit to be arranged. Students must register with an Independent Study form (available in 140 Roberts Hall).
Staff.

ENTOM 498 Undergraduate Teaching
Fall or spring. Credit to be arranged. Prerequisite: permission of instructor. Undergraduate teaching assistance in an entomology course by agreement with the instructor. Students must register with an Independent Study form (available in 140 Roberts Hall).
Staff.
Participating students assist in teaching a course allied with their education and experience. Students are expected to meet regularly with a discussion or laboratory section, to gain teaching experience, and regularly to discuss teaching objectives, techniques, and subject matter with the professor in charge.

ENTOM 499 Undergraduate Research
Fall or spring. Credit to be arranged. Prerequisite: permission of instructor. Students must register with an Independent Study form (available in 140 Roberts Hall).
Staff.

[ENTOM 621 Acarology
Fall. 4 credits. Prerequisites: ENTOM 212 and permission of instructor. Offered alternate years. Not offered 1992–93.
Lecs, M W 9:05; lab, M 1:25–4:25.
G. C. Eickwort.
An introduction to the taxonomy, morphology, and bionomics of mites and ticks, with emphasis on taxa of economic importance. A collection is required.]

[ENTOM 631 Systematics of the Coleoptera
Fall. 4 credits. Prerequisite: ENTOM 331. Offered alternate years. Not offered 1992–93.
Lecs, M W 12:20; labs, M W 1:25–4:25.
S field trips. Q. D. Wheeler.
A comprehensive review of the comparative morphology, phylogenetic relationships, classification, natural history, and distribution of the Coleoptera, including adult and immature stages. Laboratory practice in identification and methods for collection and study of beetles. A collection is required.]

[ENTOM 633 Systematics of the Diptera and Hymenoptera
Spring. 3 credits. Prerequisite: ENTOM 331. Offered alternate years. Not offered 1992–93.
Lec and two labs, hours to be arranged.
Staff.
Lectures on the classification, evolution, and bionomics of the Diptera and Hymenoptera. Laboratory studies on the literature, characters, and classification of representative genera and species of these orders, based on adult and immature stages.]

ENTOM 634 Special Topics In Systematic Entomology
Fall or spring; taught on demand. 2–4 credits. Prerequisite: permission of instructor.
Hours to be arranged. Staff.
Lectures on the classification, evolution, and bionomics of selected taxa, with accompanying laboratory studies on identification and comparative morphology. Collections sometimes required.

ENTOM 636 Seminar in Systematic Entomology
Fall or spring. 1 credit. Prerequisite: permission of instructor. S-U grades only.
Hours to be arranged. Staff.
Discussion of current topics in systematic entomology. Topics to be announced, including current theoretical issues in insect classification, evolution, and biogeography.

ENTOM 640 Applied Ecology and Pest Management
Spring. 3 credits. Prerequisites: ENTOM 444 and a course in statistics. Recommended: a course in computer science.
S-U grades optional. Offered alternate years.
Lecs,T R 2:30–3:45. P. M. Davis.
Theory and quantitative methods for characterizing arthropod population dynamics for research and pest management purposes. Course evaluates biological and climatic factors influencing population numbers, development, dispersal, and plant response to arthropod pests. Special topics include development of sampling methodology and simulation modeling.

[ENTOM 653 Advanced Insect Pathology
Fall. 3 credits. Prerequisite: ENTOM 453, BIO S 290, or permission of instructor. S-U grades optional. Not offered 1992–93.
Lecs, T R 12:20; lab, R 1:25–4:30.
D. W. Roberts.
Detailed presentations on the major diseases of insects caused by viruses, bacteria, fungi, protozoa, and nematodes. Emphasis will be on host-pathogen interactions, including at the cellular level. Also, molecular genetics and epizoological principles will be discussed. Laboratories will include practical aspects (such as bioassays) of working with each group.]

ENTOM 662 Insect Behavior Seminar
Spring. 2 credits. Prerequisites: permission of instructors and ENTOM 212 and BIO S 221 or equivalents. S-U grades optional. Offered alternate years.
Hours to be arranged. G. C. Eickwort, M. J. Tauber.

ENTOM 664 Seminar in Insect-Plant Interactions (also Biological Sciences 664)
Spring. 2 credits. Limited to 15 students. Prerequisites: entomology, ecology, evolution, organic chemistry, and written permission of instructor. S-U grades optional. Offered alternate years.
One evening a week, to be arranged.
P. P. Feeny.
For graduate students and seniors. Presentations and discussions by students on the evolution of patterns of interaction between plants and insects, emphasizing critical evaluation of concepts and evidence.

[ENTOM 672 Seminar in Aquatic Ecology
Spring. 1 credit. Prerequisites: permission of instructor or either ENTOM 456, 471 or BIO S 462, 464. S-U grades optional. Offered alternate years. Not offered 1992–93.
Hours to be arranged. B. L. Peckarsky.
Discussion and analysis of current topics in the ecology of streams, lakes and marine ecosystems, including student-generated synthesis of key papers in the literature.]

[ENTOM 674 Principles of Systematics (also Biological Sciences 674)
Spring. 4 credits. Prerequisite: ENTOM 331 or introductory systematics course in another field of biological sciences. Offered alternate years. Not offered 1992–93.
Lecs-disc-labs, M W 1:25–4:25. Staff (Q. D. Wheeler, coordinator).
An introduction to modern theory and methods of systematic biology. Lectures, readings, and discussions on theoretical systematics, including species concepts, classification, phylogenetics, and biogeography. Laboratories include various methods of analysis of data (e.g., cladistic hand and computer methods, numerical methods). Part of the grade is based on a final paper.]

[ENTOM 677 Biological Control
Fall. 3 credits. Prerequisites: ENTOM 212, BIO S 261, and permission of instructor. Offered alternate years. Not offered 1992–93. Next offered 1993–94.
Lecs, T R 9:05; lab, T 2–4:25. M. J. Tauber.
Approach and procedures in biological control of arthropod pests and weeds. Laboratory includes studies with living parasitoids and predators.]

ENTOM 685 Seminar in Insect Physiology
Spring. 1 credit. S-U grades optional. Prerequisite: permission of instructor.
Hours to be arranged. Staff.

ENTOM 690 Insect Toxicology and the Molecular Basis of Insecticide Toxicity (also Toxicology 690)
Spring. 4 credits. Prerequisites: general chemistry and organic chemistry. Undergraduate students by permission of instructor. Offered alternate years.
Lecs, M W F 9:05; lab, day to be arranged, 1:25–4:25. J. G. Scott.
The history, metabolism, and mechanism of action of synthetic and naturally occurring insecticides. Mechanisms of insecticide resistance, evaluation of insecticide toxicity, and new approaches to insecticidal compounds with biotechnology will be discussed.

ENTOM 707 Special Topics for Graduate Students
Fall or spring. Credit to be arranged. Prerequisite: permission of instructor. Not for thesis research.
Staff.

ENTOM 708 Graduate Research
Fall or spring. Credit to be arranged. Prerequisite: permission of instructor. Not for thesis research.
Staff.

ENTOM 709 Teaching Entomology
Credit to be arranged.
Staff.
Teaching entomology or for extension training.

ENTOM 710 Curation in Entomology
Fall or spring. Credit to be arranged. Prerequisite: permission of instructor. S-U grades only.
Hours to be arranged. J. K. Liebherr and staff.
The range of curatorial techniques required to operate an institutional insect collection will be investigated by working with staff. Curation of a specific taxon of interest will comprise part of the course of study.

ENTOM 800 Master's-Level Thesis Research
Credit to be arranged. Prerequisite: permission of instructor. S-U grades optional.
Staff.

ENTOM 900 Doctoral-Level Thesis Research
Credit to be arranged. Prerequisite: permission of instructor. S-U grades optional.
Staff.

Jugatae Seminar
Fall and spring.
R 4–5.
A seminar conducted by Jugatae, the entomology club of Cornell University, to discuss topics of interest to its members and guests. All interested undergraduate and graduate students are encouraged to attend.

FLORICULTURE AND ORNAMENTAL HORTICULTURE

Floriculture and Ornamental Horticulture courses are listed under Horticultural Sciences on p. 70.

Freehand Drawing and Scientific Illustration

Freehand Drawing and Scientific Illustration courses are offered through the Department of Floriculture and Ornamental Horticulture. Courses are described on p. 69.

Landscape Architecture

The Landscape Architecture Program at Cornell is sponsored by the College of Agriculture and Life Sciences through the Department of Floriculture and Ornamental Horticulture and the College of Architecture, Art, and Planning. For course descriptions, see Landscape Architecture, p. 74.

FOOD SCIENCE

R. A. Ledford, chair; D. K. Bandler, D. M. Barbano, C. A. Batt, D. H. Beermann, J. Brady, A. K. Datta, D. C. Graham, R. B. Gravani, P. F. Hopper, J. H. Hotchkiss, H. T. Lawless, E. A. Leonard, D. D. Miller, S. Mulvaney, J. M. Regenstein, S. S. H. Rizvi, J. W. Sherbon

FOOD 101 Science and Technology of Foods
Fall. 1 credit. S-U grades only.
Lec and disc, M 12:20. J. Hotchkiss and staff.
This course explores the application of science and technology to foods. Lectures will elucidate the role of engineering, biotechnology, chemistry, biochemistry, nutrition, toxicology, and microbiology in supplying the world with safe and nutritious food. An overview of food science as a discipline and career choice will be given.

FOOD 102 Contemporary Perspectives in Food Science
Spring. 1 credit. S-U grades only.
F 12:20. Field trips, F 1:25–5:00 some weeks. R. A. Ledford and staff.
A series of seminars dealing with current technological, regulatory, and international developments in food science. Field trips to four or five commercial food plants will be used to illustrate the application of current technologies.

FOOD 150 Food Choices and Issues
Spring. 2 credits. S-U grades optional.
Lecs, T R 12:20. R. B. Gravani, D. D. Miller, and staff.
This course provides nonmajors with the knowledge they need to make appropriate food choices. Lectures will emphasize the concepts necessary for selecting nutritious diets and interpreting popular nutrition literature, the impact of food science and technology on food choices, the characteristics of the major food commodity groups, and current issues affecting food quality and safety. The course is designed to provide students with practical and useful information about the foods they eat.

FOOD 200 Introductory Food Science
Fall. 3 credits.
M W F 11:15. J. W. Sherbon.
A comprehensive introduction to food science and technology—its scope, principles, and practices. Topics are constituent properties; methods of preservation; the major food groups, including their handling and processing; and current problems such as chemical additives and world feeding needs. Interrelationships between chemical and physical properties, processing, nutrition, and food quality are stressed.

FOOD 210 Food Analysis
Spring. 3 credits. Prerequisite: CHEM 104 or 208.
Lecs, M W 12:20; lab, M or F 12:20–3:20. J. W. Sherbon.
Introduces tests used by food analysts for fats, proteins, carbohydrates, and selected minor nutrients. Emphasis is on understanding and use of good analytical techniques, including gravimetric, volumetric, and spectrophotometric methods. A special project for the total analysis of a complex food provides experience in technique selection, work scheduling, and execution.

FOOD 311 Milk and Frozen Desserts
Fall. 2 credits. Prerequisite: FOOD 322 or permission of instructor. Offered alternate years.
Lec, R 12:20; lab, R 1:25–4:25. J. W. Sherbon and D. K. Bandler.
Deals with the principles and practices of processing fluid milk products and frozen desserts. The chemical, microbiological, and technological aspects of processing these dairy products are considered. Emphasis will be upon product quality and recognition of factors affecting it.

FOOD 321 Food Engineering I
Fall. 3 or 4 credits. Prerequisites: physics and FOOD 100.
Lecs, M W F 9:05; lab, T 1:25–4:25 (lab required for 4 credit option). S. S. H. Rizvi.
Intended to give food science students an introduction to the engineering aspects of food processes and equipment. Emphasis on the fundamental concepts of momentum, heat, and mass-transport processes.

FOOD 322 Unit Operations in Food Processing I
Spring. 3 credits. Prerequisites: FOOD 100 and 321 or permission of the instructor.
Lecs, T R 10:10; lab, T 1:25–4:25. S. Mulvaney.
Deals with the principles and practices of concentration, drying, and freezing applied to foods. Current processing methods and their relations to the chemistry, microbiology, and technology of raw materials and final products are discussed. Application of engineering science to the freezing, concentration, and drying of foods. The course will take a systems analysis approach to each unit operation, including choice of equipment and effects of processing on product attributes.

FOOD 331 Statistical Quality Control of Food Processing
Spring. 1 credit. Prerequisite: AG EC 310 or equivalent.
Lab, R 1:25–4:25. G. Houghton.
An introduction to the statistical tools used to control quality in food processing operations. Topics covered include control charts and other process control tools as well as acceptance sampling.

FOOD 351 Milk Quality
Spring. 1 credit. Prerequisite: Animal Science 350 or equivalent or permission of instructor.
F 12:20. D. K. Bandler.
Focuses on the important aspects of farm sanitation and milk handling as they affect milk flavor and quality. The course is an overview of quality control tests, basic microbiology, cleaning and sanitizing, and special problems in manufacturing and marketing fresh and storable dairy products.

FOOD 394 Food Microbiology Lectures
Fall. 2 credits. Prerequisites: BIO S 290 and 291.
M W 12:20. D. C. Graham, C. A. Batt.
The major families of microorganisms of importance in foods are studied systematically, with emphasis on the roles of those organisms in food preservation, food fermentations, and public health.

FOOD 395 Food Microbiology Laboratory
Fall. 2 credits. Graduate students must have permission of the instructor.
M W 2–4:25. R. A. Ledford.
Work includes study of the physiological characteristics of representative food microorganisms, practice in using general and special methods for microbiological testing and control of food products, and practice in the application of a systematic approach to controlling the safety of foods.

FOOD 396 Food Safety Assurance
Spring. 2 credits. Prerequisite: FOOD 100 or permission of instructor.
Lec, T R 9:05. R. B. Gravani.
This course provides information on procedures to control biological, chemical, and physical hazards and assure the safety of foods. Topics include discussions on Hazard Analysis Critical Control Point (HACCP) programs, total quality management, and the application of current technologies in reducing the incidence of foodborne illness. Case studies and exercises will be used to demonstrate and apply the key principles that are discussed.

FOOD 400 Senior Seminar in Food Science and Technology
Fall. 1 credit. Limited to seniors.
Lec, M 4:30. R. A. Ledford, D. K. Bandler.
With assistance of faculty members, students complete a study of the literature on topics of current interest in food science and technology. Students make oral and written reports.

[FOOD 401 Concepts of Product Development
Spring. 2 credits. Prerequisite: FOOD 100 or equivalent. Offered alternate years. Not offered 1992–93.
M W 9:05–9:55. J. H. Hotchkiss.
A discussion of the sequence of events in developing and marketing new food products. Topics include packaging and labeling, food additive and ingredient regulations, taste panels, market testing, market research, and patents.]

FOOD 403 International Food Science and Development
Spring. 3 credits. Offered alternate years.
Lecs, T R 8:30–9:55. D. C. Graham.
A critical evaluation of humanity's needs for food, especially in the developing world, and of the international food technologies, organizations, and policies necessary to meet such needs. Traditional methods and fermentation food processes of basic foods for specific developing countries are described.

[FOOD 405 Waste Management and Energy Conservation
Spring. 2 credits. Prerequisite: FOOD 100 or its equivalent. Offered alternate years. Not offered 1992–93.
Lec, M 12:20, lab, M 2–4:25.
J. M. Regenstein.
Field trips, laboratories, and demonstrations. Deals with the principles and practices related to managing, reducing, and reclaiming wastes from food plants and other unit operations important to the food industry. Selected types of methods used to conserve energy will be covered.]

[FOOD 406 Food Processing Fermentations Lectures
Fall. 2 credits. Prerequisite: background in microbiology. Offered alternate years. Not offered 1992–93.
Lecs, T R 11:15. D. K. Bandler.
Principles and practices of lactic acid and alcoholic fermentation processes as they apply to cheeses, cultured dairy foods, meats, vegetables, wines, beers, and related products.]

FOOD 409 Food Chemistry
Spring. 3 credits. Prerequisite: BIO S 330 or 331.
Lecs, M W F 9:05. D. D. Miller, J. Brady, J. M. Regenstein, J. P. VanBuren.
The chemistry of foods and food ingredients. Chemical and physical properties of water, proteins, lipids, carbohydrates, and other food components/additives are discussed in the context of their functional roles in foods. The effects of chemical changes during processing and storage on quality and nutritional aspects of several food commodity groups (milk, meat, fruits and vegetables, cereals and legumes) are described.

FOOD 410 Sensory Evaluations of Foods
Fall. 3 credits. Prerequisite: statistics.
Lecs, M W F 10:10. H. T. Lawless.
Deals with the sensory techniques used in evaluating the flavor, color, and texture of foods and the evaluation of consumer acceptance. Includes methods for measuring these qualities, underlying psychological principles, statistical methods for analyzing results, and establishing a full-service sensory evaluation program.

FOOD 411 Food Mycology
Fall. 3 credits. Prerequisite: BIO S 290 or 291 or equivalent. Recommended: FOOD 394. Offered alternate years.
Lecs, T R 11:15; lab, W 1:25–4:25.
D. C. Graham.
To acquaint students with important fungi, from the standpoint of their beneficial as well as their harmful effects in food production, preservation, and spoilage. Laboratories deal with morphology, physiology, culture and isolation, identification of fungi, and isolation and quantification of fungal toxins.

FOOD 415 Principles of Food Packaging
Fall. 3 credits.
M W F 9:05. J. H. Hotchkiss.
The chemical and physical properties and manufacture of the basic materials used to construct packaging are discussed. The influence of packaging on shelf life is presented. Emphasis is on newer packaging technologies and materials. Economics, design, and regulation of food packaging are briefly presented.

[FOOD 416 Food Packaging Laboratory
Spring. 2 credits. Prerequisite: FOOD 415. Offered alternate years. Not offered 1992–93.
Lec, F 8; lab to be arranged.
J. H. Hotchkiss.
A laboratory course designed to introduce several testing methods used to evaluate adequacy of food packaging. Emphases are on physical testing methods of packaging materials and the evaluation of total packages. Students will design and build a new food package.]

[FOOD 417 Sensory Analysis of Dairy Products
Spring. 1 credit. S–U grades optional. Not offered 1992–93.
Lec, M 2:30–4:25. H. Lawless.
A survey of the traditional quality grading techniques used for sensory evaluation of dairy products, and a comparison of those techniques to alternative sensory evaluation procedures. Students will prepare samples for one or two demonstrations of classical dairy defects such as lipid oxidation or hydrolytic rancidity. Tasting and practice in identifying defects will be given in class. Primary attention will be given to sensory quality factors in fluid milk, cheddar cheese, cottage cheese, and ice cream.]

FOOD 419 Food Chemistry Laboratory
Spring. 2 credits. Prerequisites: BIO S 330 or 331 and concurrent registration in FOOD 409.
Lab, W 12:20–4:25. D. D. Miller.
A laboratory course emphasizing fundamental chemical principles and laboratory techniques necessary for an understanding of the chemistry of foods. Relationships between chemical composition and functional, nutritional, and organoleptic properties of foods are stressed. Many of the laboratory techniques involved are common to those used in biochemistry laboratories (e.g., electrophoresis, chromatography, enzyme assays) but are applied to specific foods or beverages.

FOOD 421 Unit Operations in Food Processing II
Fall. 3 credits. Prerequisite: FOOD 322.
Lecs, T R 10:10; lab, R 1:25–4:25.
S. S. H. Rizvi, S. Mulvaney.
Principles and practices of thermal processing of foods, as a preservation technique, with emphasis on kinetics of destruction of microorganisms and quality factors. Fundamentals and applications of extrusion and microwave processes. Laboratory experience in retorting of foods, microwave and extrusion processing.

FOOD 422 Food Engineering II
Spring. 3 credits. Prerequisite: FOOD 421. Offered alternate years.
Lecs, M W F 10:10. S. S. H. Rizvi, S. Mulvaney.
Application of transport phenomena to food processing unit operations. Fundamentals of food process design, scale-up, and control.

FOOD 447 International Postharvest Food Systems
Fall. 2 or 3 credits. Prerequisite: freshman chemistry. S-U grades optional.
T R 10:10. M. C. Bourne and staff.
An interdisciplinary course designed for all undergraduate and graduate students in ALS that describes postharvest food losses and methods to reduce the loss. Topics include storage and care of unprocessed and minimally processed foods such as cereal grains, fruits, vegetables, tubers, and fish; biology and control of fungi, insects, and vertebrates in foods; chemical causes of quality loss; effects of climate; and economic and social factors affecting food preservation and storage. Emphasis is given to the problems in developing countries. The third credit requires a written case study of a country or commodity.

FOOD 450 Fundamentals of Food Law
Spring. 2 credits. Offered alternate years.
Lecs, M 1:25–3:20. J. M. Regenstein.
Introduction to the complex array of federal and state statutes and regulations that control the processing, packaging, labeling, and distribution of food, including aspects of safety and nutritive value. Emphasis will be on the Food and Drug Administration and U.S. Department of Agriculture regulations, but the course also will refer to other regulatory agencies.

[FOOD 456 Advanced Concepts in Sensory Evaluation
Spring. 2 credits. Prerequisite: FOOD 410. S–U grades optional. Offered in alternate years. Not offered 1992–93.
Lecs, F 1:25–3:25. H. T. Lawless.
Readings and discussions of primary source materials in sensory evaluation, including historical perspectives, psychophysics, perceptual biases, human information processing. Concepts influencing detection of sensory differences, use of rating scales, and characterization of sensory properties will be emphasized.]

FOOD 497 Special Topics in Food Science
Fall or spring. 3 credits maximum. Prerequisite: permission of instructor. Students must register with an Independent Study form (available in 140 Roberts Hall). S-U grades optional.
Staff.
For the food science student. May include individual tutorial study, a special lecture topic selected by a professor or a group of students, or selected lectures of a course already offered. As topics may be changed, the course may be repeated for credit.

FOOD 498 Undergraduate Teaching Experience
Fall or spring. 3 credits maximum. Prerequisite: permission of instructor. Students must register with an Independent Study form (available in 140 Roberts Hall). S-U grades only.
Staff.
Students assist in teaching a course appropriate to their previous training. Students will meet with a discussion or laboratory section and will regularly discuss objectives with the course instructor.

FOOD 499 Undergraduate Research in Food Science
Fall or spring. 4 credits maximum. S-U grades optional. Students must register with an Independent Study form (available in 140 Roberts Hall). Except for students enrolled in the honors program, credit will be limited to 4 credits total.
Hours to be arranged. Staff.
Independent study.

FOOD 600 Seminar
Fall or spring. 1 credit. Required of all food science graduate students. S-U grades only.
T 4:30.

[FOOD 601 Food Protein Chemistry
Fall. 3 credits. Limited to graduate students and to seniors with permission of instructor. Prerequisite: FOOD 409 or equivalent. Offered alternate years. Not offered 1992–93.
Lecs, M W F 9:05. Staff.
The chemistry and physical chemistry of proteins are discussed critically with respect to current methods of characterizing and purifying proteins. Food protein functionality is emphasized.]

FOOD 604 Chemistry of Dairy Products
Fall. 2 credits. Limited to 16 students. Prerequisites: organic chemistry, biochemistry, knowledge of dairy-product manufacturing procedures, and permission of instructor. Offered alternate years.
Lecs, F 12:20–2:25. D. M. Barbano.
A detailed study of milk constituents and their properties. Properties of various milk constituents are related to observed physical and chemical changes that occur in dairy products during and after processing. This course will emphasize current research in dairy chemistry.

FOOD 605 Physical Chemistry of Food Components
Fall. 3 credits. Prerequisite: an undergraduate course in physical chemistry. Offered alternate years.
Lecs, M W F 10:10. J. W. Brady.
This course will cover the physical properties of food molecules. Emphasis will be placed on the molecular basis of structural characteristics; colloidal properties; molecular interactions; foams, gels; and water binding of foods.

[FOOD 607 Advanced Food Microbiology
Spring. 2 credits. Prerequisites: food microbiology, genetics (preferred). Offered alternate years. Not offered 1992–93.
M W 11:15. C. A. Batt.
There have been great advances in applying the modern tools of molecular biology to the detection of microorganisms and their metabolites. The primary emphasis of this course will be to review the recent developments in the theory and application of nucleic acid and antibody-based detection systems, especially as they concern food safety. In addition, other approaches, including measurement of impedence, ATP, and endotoxins, will be discussed.]

FOOD 610 Introductory Chemical and Environmental Toxicology (also Toxicology 610)
Fall. 3 credits. Prerequisites: biochemistry and animal physiology.
Lecs, M W F 11:15. J. Hotchkiss and staff.
Introduction to the concepts and essentials of toxicology. The various biological responses to toxicants and the in vivo and in vitro methods of assessing toxicity, as well as the role of epidemiology, will be discussed. The chemical and biological factors that affect toxicity and specific sources of toxicants, including air pollution, agriculture, industrial processes, foods, naturally occurring toxicants, and social poisons will be presented. Regulation of toxic materials will be introduced.

FOOD 616 Flavors - Analysis and Applications
Spring. 2 credits. S-U grades optional. Offered alternate years.
Lec, F 1:25; disc, F 2:30. H. Lawless, T. Acree.
An advanced course in sensory and instrumental analysis of flavors, flavor chemistry, and flavor applications in foods for food scientists and those in related fields concerned with human food perception and consumption. The course will survey taste, aroma and volatile flavors, and trigeminal stimuli from the perspectives of chemical structures, methods of analysis, uses and interactions in food systems, and consumer acceptance.

[FOOD 620 Food Carbohydrates (also Nutritional Sciences 620)
Spring. 2 credits. Limited to qualified seniors and graduate students. Prerequisite: BIO S 330 or equivalent. Offered alternate years. Not offered 1992–93.
Lecs, T R 10:10. B. A. Lewis, J. W. Brady.
A consideration of the chemistry of carbohydrates, including sugars, starches, pectins, hemicelluloses, gums, and other complex carbohydrates. Emphasis is on the intrinsic chemistry and functionality in food systems and the changes occurring during food processing and storage.]

[FOOD 665 Engineering Properties of Foods (also Agricultural and Biological Engineering 665)
Spring. 2 credits. Prerequisite: course in transport processes or unit operations as applied to foods; or permission of instructor. Offered alternate years Not offered 1992–93.
Lecs, T R 12:20. S. S. H. Rizvi, A. K. Datta, S. J. Mulvaney.
Theories and methods of measurement and prediction of rheological, thermal, and mass transport properties of foods and biomaterial systems. Emphasis is on physical-mathematical basis of measurement as well as the prediction processes. Examples of appropriate use of these properties in engineering design and analysis of food processes will also be provided.]

FOOD 800 Research
Fall or spring. Credit to be arranged. Maximum credit, 10/semester. Limited to master's and doctoral candidates with permission of the graduate field member concerned. S-U grades only.

Related Courses in Other Departments

Computing in Agricultural and Biological Engineering (ABEN 151)

Food Engineering: Design of Equipment and Processes (ABEN 466)

Marketing (Agricultural Economics 240)

Food Industry Management (Agricultural Economics 443)

Meat Science (Animal Science 290)

Commercial Meat Processing (Animal Science 490)

FREEHAND DRAWING AND SCIENTIFIC ILLUSTRATION

Freehand Drawing is a program within the Department of Floriculture and Ornamental Horticulture. Other courses offered by the department are listed under Horticultural Sciences and Landscape Architecture.

FR DR 109 Nature Drawing
Fall. 3 credits. Limited to 25 students. S-U grades optional. Permission of instructor required.
M W F 10:10–12:05. R. J. Lambert.
A beginning course with emphasis on the drawing of natural forms: plants, animals, and landscapes. Of particular interest to students in floriculture and ornamental horticulture, landscape architecture, biological sciences, nature education, on similar fields. Outside field notebook assignments.

FR DR 111 Freehand Drawing (also LA 141)
Fall. 3 credits. Each section limited to 25 students. S-U grades optional.
Studios, T R 9:05–11. P. H. Horrigan.
Developing ability in freehand observation drawing. Freehand still life, landscape, figure, and perspective drawing will be included. Weekly sketchbook assignments.

FR DR 210 Architectural Sketching in Watercolor
Summer. 3 credits. S-U grades optional.
M T W R F 11:30–12:45. R. J. Lambert.
Practice in outdoor architectural sketching, primarily in watercolor, but including pen and ink, pencil, and colored pencil. Studio will develop working sketches into complete renderings. Principles of perspective are taught and applied. For any student who wishes to develop skill in handling watercolor. Outside-of-class sketchbook work required.

FR DR 211 Freehand Drawing and Illustration
Fall. 2 credits. Prerequisite: FR DR 111 or equivalent. S-U grades optional.
6 studio hours scheduled in 2- or 3-hour units between 9:05 and 12:05 M T W R F.
R. J. Lambert.
Progression to the organization of complete illustrations. Subject matter largely from sketchbooks, still life, and imagination. Composition, perspective, and ways of rendering in different media are considered.

FR DR 214 Watercolor
Spring. 2 credits. Prerequisite: FR DR 111 or equivalent. S-U grades optional.
6 studio hours scheduled in 2- or 3-hour units between 9:05 and 12:05 M T W R F.
R. J. Lambert.

A survey of watercolor techniques. Subject matter largely still life, sketchbook, and on-the-spot outdoor painting.

FR DR 316 Advanced Drawing
Fall or spring. 2 credits. Prerequisite: FR DR 109, 211 or permission of instructor. S-U grades optional.
6 hours to be arranged. R. J. Lambert.
For students who want to attain proficiency in a particular type of illustration or technique.

[FR DR 417 Scientific Illustration
Fall. 2 credits. Prerequisite: FR DR 211 or 316 or equivalent. S-U grades optional for graduate students only. Not offered 1992–93.
6 studio hours scheduled between 9:05 and 12:05 M W F. Staff.
A survey of methods of illustration. Training in techniques of accurate representation in media suitable for reproduction processes, including pen and ink, scratchboard, wash, and mixed media.]

FRUIT AND VEGETABLE SCIENCE: HORTICULTURAL SCIENCE

See Horticultural Sciences.

HORTICULTURAL SCIENCES

Horticultural science courses at Cornell are taught by the faculty of the Department of Floriculture and Ornamental Horticulture and the Department of Fruit and Vegetable Science.

Floriculture and Ornamental Horticulture

G. L. Good, chair; M. I. Adleman, N. L. Bassuk, C. F. Gortzig, J. Gruttadaurio, N. W. Hummel, Jr., T. H. Johnson, R. E. Kozlowski, D. W. Krall, R. J. Lambert, R. W. Langhans, L. J. Mirin, R. G. Mower, K. W. Mudge, J. C. Neal, A.M. Petrovic, D. A. Rakow, R. T. Trancik, P. J. Trowbridge, T. C. Weiler, T. H. Whitlow

Fruit and Vegetable Science

E. E. Ewing, chair; R. R. Bellinder, G. D. Blanpied, L. L. Creasy, L. A. Ellerbrock, D. E. Halseth, J. R. Hicks, D. J. Lisk, P. M. Ludford, I. A. Merwin, P. L. Minotti, M. P. Pritts, J. Sieczka, W. C. Stiles, L. D. Topoleski, D. H. Wallace, H. C. Wien, D. A. Wilcox-Lee, D. W. Wolfe

Courses by Subject:

General horticulture: 101, 102

Crop production:

Controlled Environment Agriculture: 410, 411

Fruit: 200, 442, 444, 445, 450

Greenhouse: 410, 411

Nursery: 400, 420

Turfgrass: 330

Vegetable: 225, 456, 460

Extension education: 629

Floral design: 205, 210

Horticultural physiology: 400, 405, 450, 455, 456, 460, 462, 615

Independent study, research, and teaching: 470, 495, 496, 497, 498, 499, 500, 605, 700, 800, 900

Internships: 496

Landscape architecture (professionally accredited program)

Landscape horticulture: 435, 491, Landscape architecture 142, 291, 311, 312, 480, 490

Plant materials: 230, 243, 300, 301, 335, 430

Plant propagation: 400

Postharvest physiology: 325, 625, 630

Sales and service businesses: 210, 425

Seminars: 495, 600, 602, 630, 636

Turfgrass management: 330

Vegetable types and varieties: 220, 465

HORT 101 Introduction to Horticultural Science
Fall. 4 credits.
Lecs, M W F 10:10; lab, W 2–4:25.
C. F. Gortzig.
An introduction to horticulture in all of its components: floriculture, landscape horticulture, fruit and vegetable science, and related professional and commercial fields. Emphasis is on the history, geography, and literature of the field; the structure and organization of the component industries, institutions, and professions; and the role of science and technology in the continuing development of horticultural practice. Field trips, including at least one all-day field trip, are taken to horticultural firms, institutions, and historic sites.

HORT 102 General Horticulture
Spring. 4 credits. Each lab limited to 25 students.
Lecs, M W F 10:10; lab, M, T, or W 2–4:25.
L. D. Topoleski.
Acquaints the student with applied and basic horticulture. Open to all students who want a general knowledge of the subject or who want to specialize in horticulture but have a limited background in practical experience or training in plant science. Includes flower, fruit, and vegetable growing and gardening techniques.

HORT 200 Introductory Pomology
Fall. 3 credits. S-U grades optional.
Lecs, T R 10:10; lab, T 1:25–4:25.
I. A. Merwin.
A survey of fruit science, emphasizing the natural history, botany, physiology, and production of edible fruits in temperate-climate areas. Topics include varietal breeding and propagation, environmental and sustainability issues, and practical methods of fruit production. Labs and field trips will provide hands-on experience and tours of regional orchards.

HORT 205 Floral Design
Fall or spring. 2 credits. Each of the two studios is limited to 22 students. Prerequisite: permission of instructor, with preference given to plant science majors, then to students in education, design, and journalism. Charge to purchase instructional plant materials that the student will keep: $85. Enrolled students who do not attend the first session and fail to notify the secretary in 20 Plant Science Building of their absence will automatically be dropped.
T or R 1:25–4:25. Staff.
A study of the established floral design techniques of this country, presenting the principles and the mechanics of the art to prepare the student to design for varying themes and occasions. Other aspects include selection, preparation, and factors affecting keeping-quality of materials. Emphasizes the economical use of all supplies.

HORT 210 Floral Design: Intermediate
Fall. 2 credits. Prerequisite: HORT 205 or permission of instructor; preference given to students planning a career in retail horticulture. Charge to purchase instructional materials that the student will keep: $90.
Studio W 1:25–4:25. Staff.
Advanced study of the art of floral design. The students assist in scheduling the design themes and occasions for floral display during the semester. Enrolled students who do not attend the first session and fail to report their absence to the secretary in 20 Plant Science Building will automatically be dropped.

HORT 220 Vegetable Types and Identification
Fall. 2 credits.
T 2–4:25. L. D. Topoleski.
Acquaints students with the vegetable species grown in the Northeast and the pests and disorders encountered in their production. Subjects covered include identification of economically destructive weeds, diseases and insects of vegetables, identification of vegetable and weed seeds, seedlings, nutrient deficiencies, vegetable judging, grading, and grade defects.

HORT 225 Vegetable Production
Fall. 4 credits. Field trip fee, no more than $20.
Lecs, M W F 11:15; lab, W 2–4:25; 1 S field trip and 3 field trips (Sept), W 11:15–6.
L. A. Ellerbrock.
Intended for those interested in the production, processing, and marketing of vegetables. Topics included are techniques, problems, and trends in the culture, harvesting and storage of the major vegetable crops. Field trips to conventional and organic farms and hands-on experience in growing vegetables in the laboratory are included.

HORT 230 Woody Plant Materials
Spring. 4 credits. Fee for lecture-laboratory manual: $25.
Lecs, T R 9:05; lab, T 2–4:25 and W or F 2–4:25. R. G. Mower.
A study of the trees, shrubs, ground covers, and vines used in landscape plantings. Emphasis is on winter identification and values for use as landscape material.

HORT 243 Taxonomy of Cultivated Plants (also Biological Sciences 243)
Fall. 4 credits. Prerequisite: One year of introductory biology or written permission of instructor. May not be taken for credit after BIO S 248. Offered 1992 and alternate years.
Lecs, M W 10:10; labs, M W 2–4:25.
M. Luckow.
An introduction to the study of ferns and seed plants with an emphasis on cultivated families and genera. Lectures will cover the principles and methods of systematics, basic rules of nomenclature, and relationships between families, all in the context of cultivated plants. Laboratories will teach sight identification of important plant families and identification of unknowns using analytic keys.

HORT 300 Garden and Interior Plants I
Fall. 3 credits. Fee for lecture-laboratory manual: $25.
Lecs, T R 10:10; lab, T 2–4:25.
R. G. Mower.
A study of ornamental plants used in garden and interior situations. The first seven weeks cover primarily herbaceous annuals and perennials, with the laboratory devoted to various practical gardening activities. The remainder of the semester covers the major kinds of foliage and flowering plants used in the home and in other interior landscape situations. Emphasis is on identification, use, and general cultural requirements.

HORT 301 Garden and Interior Plants II
Spring. 3 credits. Prerequisite: HORT 300 or permission of instructor. Fee for lecture-laboratory manual: $25.
Lecs, M W 11:15; lab, M 2–4:25.
R. G. Mower.
A continuation of Horticultural Sciences 300. The first seven weeks are devoted to a further study of interior plants, with emphasis on specialized groups of interior plants such as orchids, cacti and succulents, gesneriads, ferns, palms, and bromeliads. The second seven weeks are devoted to outdoor herbaceous plants, such as tulips, daffodils, crocuses, and irises, as well as other spring-blooming bulbs and perennial plants. Outdoor laboratories emphasize practical gardening activities appropriate to the spring season.

HORT 325 Practical Aspects of Postharvest Handling of Horticultural Crops
Spring. 3 credits.
Lecs, M W 9:05; lab, T 1:25–3:55.
J. R. Hicks.
A study of changes that occur in horticultural crops between harvest and consumer. Practices that affect the rate of change and the final effect on quality of the commodity are discussed. Maturity/quality indices, preharvest treatments, and harvesting/handling practices and storage/transportation requirements of selected horticulture crops are covered.

HORT 330 Turfgrass Management
Fall. 3 credits. Prerequisite: SCAS 260. Offered alternate years.
Lec, R 11:15–1:10; lab, T 11:15–1:10.
A. M. Petrovic.
Study of the scientific principles involved in the management of golf courses, athletic fields, parks, industrial grounds, and sod production. Considerations given to principles of establishment, mowing, irrigation, growth and development, species selection, and nutrition in the management of turfgrass sites.

HORT 335 Woody Plant Materials for Landscape Use
Fall. 3 credits. Limited to 30 students. Primarily for landscape architecture majors. Fee for lecture-laboratory manual, $25.
Lec, M W 9:05; lab, R 1:25–4:25.
R. G. Mower.
A study of the trees, shrubs, vines, and ground covers used in landscape plantings in the northeastern United States. Emphasis is on leaf identification and on characteristics that determine the usefulness of each as landscape subjects.

HORT 400 Principles of Plant Propagation
Fall. 3 credits. Prerequisites: BIO S 242 and 244 or another course in plant physiology.
Lecs, T R 9; lab, R 1:25–4:25.
K. W. Mudge.
Propagation of plants using vegetative techniques including cuttage, graftage, tissue culture, and propagation from seed. Physiological, environmental, and anatomical principles are stressed rather than hands-on techniques. Examples include horticultural, agronomic, and forestry crops.

[HORT 405 Physiology of Horticultural Plants
Spring. 4 credits. Prerequisites: BIO S 242 and 244; 341 or permission of instructor. Not offered 1992–93.
Lec, M W F 8; lab to be arranged. Staff.
A study of the physiology of growth and development of horticultural plants in response to their environment.]

[HORT 410 Principles of Greenhouse-Crop Production
Spring. 4 credits. Limited to 40 students. Preference given to juniors. Prerequisites: HORT 400 and BIO S 242 and 244 (may be taken concurrently) or permission of instructor. Offered alternate years. Cost for half-day field trip and special laboratory supplies: $80. Three-day field trip also required: $75. Not offered 1992–93.
Lecs, M W F 8; lab, R 2–4:25. T. C. Weiler.
A study of commercial production of greenhouse crops with emphasis on their culture as influenced by greenhouse environment. Field trips are made to commercial greenhouses.]

HORT 411 Greenhouse Production Management
Spring. 4 credits. Primarily for seniors. Prerequisite: an elementary course in horticulture or equivalent. Cost of field trips: $150.
Lecs, T R 10:10–12:05; lab, 3 hours to be scheduled. Two field trips.
R. W. Langhans.
Intended to provide the latest information on efficient operation and administration of a commercial greenhouse, outside the sphere of production methods for specific crops. Consideration is given to the industry, centers of production, competition, location, types of structures, heating, ventilation, cooling, fertilizing, watering systems, and business analysis and management.

HORT 420 Principles of Nursery-Crop Production
Fall. 4 credits. Prerequisite: HORT 400.
Lecs, M W F 9:05; lab, M 2–4:25; field trips are included. G. L. Good.
Principles of commercial production of nursery crops to marketable stage, including postharvest handling and storage. Term project required. Field trips are made to commercial nurseries.

HORT 425 Horticultural Sales and Service Businesses
Spring. 4 credits. Prerequisites: AG EC 240 or permission of instructor. Cost of field trip approximately $150.
Lecs, M W F 10:10; lab W 1:25–4:25.
C. F. Gortzig.
A study of the application of horticultural, marketing, and management principles and practices in the operation of horticultural sales and service firms, e.g., garden centers, retail florist and nursery stores, wholesale marketing operations, mail-order businesses, mass markets, interior and outdoor landscape-service and related firms. Weekly field trips to commercial operations and one 3–4-day field trip to a metropolitan area are taken.

HORT 430 Special Topics in Ornamental Plants
Fall or spring. Credit to be arranged. Primarily for upperclass floriculture and ornamental horticulture majors. Prerequisites: HORT 230, 300, 301, 335, or the equivalent, and permission of instructor.
Hours to be arranged. R. G. Mower.
Topical subjects in plant materials. Independent and group study of important groups of woody and herbaceous plant materials not considered in other courses. The topic is given in the supplementary announcement.

HORT 435 Landscape Management
Fall. 4 credits. Prerequisites: HORT 230 or 335, and BIO S 241 or permission of instructor.
Lec, M W F 12:20–1:10; lab T 1:25–4:25.
D. A. Rakow.
A study of the practices involved in the planting and maintenance of woody ornamental plants in the landscape. The major emphases will be on planting and post-planting techniques, water and fertilization management, pruning, and general tree care. The lectures will focus on the physiological bases for essential management principles. Labs have a hands-on focus.

HORT 442 Small Fruits
Fall. 3 credits. Offered alternate years.
Lecs, M W 9; lab, M 1:25–4:25. M. P. Pritts.
A study of the evolution, breeding history, and physiology of strawberries, raspberries, blackberries, blueberries, and other minor small fruit crops, and of cultural practices that influence productivity, fruit quality, and pest damage. Marketing and economics will be considered, and alternative production practices for both commercial and home gardeners will be discussed.

[HORT 444 Viticulture
Fall. 3 credits. Offered alternate years. Not offered fall 1992.
Lecs, T R 9:05; lab, R 2–4:25. L. L. Creasy.
Grape growing, with emphasis on the viticulture of the Great Lakes region, is presented as a series of decisions on varieties, sites, vine management, and vine protection. Those decisions are based on meteorology, soils, vine and grape anatomy and physiology, and protection of the vine and grapes from injury.]

HORT 445 Temperate Tree Fruits
Spring. 3 credits. Prerequisite: HORT 200. S-U grades optional. Offered alternate years.
Lecs, T R 10:10; lab, T 1:25–4:25.
I. A. Merwin.
A treatment of problems of concern to tree fruit growers, such as site selection, planting and pruning systems, water relations, cold hardiness, fruit growth, maturity, flowering, and protection from pests. Physiological and practical aspects are emphasized.

[HORT 450 Soil Management and Nutrition of Perennial Crops
Fall. 3 credits. Offered alternate years. Not offered fall 1992.
Lecs, M W 8; lab, M 1:25–4:25.
W. C. Stiles.
Fundamentals of mineral nutrition and soil management for perennial horticultural crops. Mineral nutrition aspects deal with diagnostic

techniques, interpretation of tissue and soil analyses, and nutrient requirements for optimizing crop performance. Soil management effects on crop performance, nutrient relationships, and interaction with other components of crop production systems are emphasized.]

HORT 455 Fertility Management and Nutrition of Vegetable Crops
Fall. 3 credits. Prerequisite: SCAS 260 or equivalent.
Lecs, M W 10:10; lab and disc, M 2–4.
P. Minotti.
The course deals with both major and minor elements including fertilization programs, interpretation of tissue and soil analyses, nutrient interactions, induced deficiencies, toxicities as well as the effects of organic matter, crop residues, and specific crop sequences. The course emphasizes hands-on field and greenhouse experiments and small group discussions.

HORT 460 Plant-Plant Interactions
Spring, weeks 1–6. 2 credits. Prerequisite: any crop production course or permission of instructor.
Lecs, M W F 10:10; lab, M 2–4:25; disc, R or F 1, 2, or 3 (1 hr). H. C. Wien.
The manner in which plants interfere or positively interact is examined for the management of cropping systems. Competitive and chemical interactions are considered between weeds and crops, among crops in polyculture, and between individuals in monoculture. Examples will be taken from both temperate and tropical monoculture and intercropping systems.

HORT 462 Vegetable Crop Physiology
Spring, weeks 7–14. 3 credits. Prerequisites: HORT 225 and BIO S 242.
Lecs, M W F 10:10; lab, M 2–4:25; disc, R or F 1, 2, or 3 (1 hr). H. C. Wien.
Study of the physiological processes that determine the timing, quantity, and quality of vegetable crop yield. Processes of flower induction, fruit set, fruit growth, and the relations between vegetative and reproductive growth are covered. The course emphasizes practical hands-on greenhouse experiments and weekly small-group discussions.

HORT 465 Vegetable Varieties and Their Evaluation
Fall, weeks 1–7. 2 credits. Prerequisites: HORT 225 or permission of instructor. S-U grades only. Offered alternate years.
Lecs, W F 8; lab, F 1:25–4:25. D. W. Wolfe and H. C. Wien.
Principles of vegetable variety evaluation and selection of techniques in relation to program objectives. Morphology, yield, and quality of selected crops will be studied in the field. The seed industry will be briefly discussed.

HORT 470 Special Topics in Pomology
Spring. 3 credits. Open to undergraduates by permission.
Hours to be arranged. Staff.
Selected topics are considered with respect to the current literature, experimental techniques, or applied technologies. Topics change from one year to another and reflect the expertise and research interests of the professors who participate. Topics selected for each term will be announced several months before the term begins.

HORT 491 Design and Plant Establishment (also Landscape Architecture 491)
Fall. 3 credits. Prerequisite: HORT 230 or permission of instructor.
Lecs, T R 12:20; studio, R 1:25–4:25.
N. L. Bassuk and P. J. Trowbridge.
This course will focus on the establishment of woody and herbaceous plants in urban and garden settings. By understanding the special constraints placed on plants, we will be able to critically assess and modify potential planting sites, select appropriate trees, shrubs and ground covers for a given site, and learn the principles and practices of plant establishment both in the ground and in contained environments. Design followed by specifications and graphic details will be produced to implement these practices. Techniques for tree preservation and land reclamation/revegetation will be discussed.

HORT 495 Undergraduate Seminar
Fall or spring. May be taken twice for one credit per semester. S-U grades only. Graduate students should enroll in HORT 600 or 602.
Section 1: Undergraduate participation in floriculture and ornamental horticulture departmental weekly seminar series.
R 12:20. D. W. Krall, D. A. Rakow.
Section 2: Undergraduate participation in fruit and vegetable science departmental weekly seminar series.
R 4:30. Staff.

HORT 496 Internship in Horticultural Sciences
Fall or spring. Credit variable. S-U grades optional. Prerequisite: permission of student's adviser in advance of participation in internship programs. Students must register with an Independent Study form (available in 140 Roberts Hall) signed by the faculty member who will supervise their study and assign their grade.
Staff.

HORT 497 Independent Study in Horticultural Sciences
Fall or spring. Credit variable. S-U grades optional. Prerequisite: permission of instructor(s). Students must register with an Independent Study form (available in 140 Roberts Hall.) Independent study in horticultural sciences under the direction of one or more faculty members.
Hours to be arranged. Staff.

HORT 498 Undergraduate Teaching Experience
Fall or spring. Credit variable. S-U grades optional. Prerequisites: previous enrollment in course to be taught or equivalent, and written permission of the instructor. Students must register with an Independent Study form (available in 140 Roberts Hall.)
Hours to be arranged. Staff.
Designed to give qualified undergraduate students teaching experience through actual involvement in planning and teaching horticultural sciences courses under the supervision of departmental faculty members. This experience may include leading discussion sections; preparing, assisting in, or teaching laboratories; and tutoring.

HORT 499 Undergraduate Research
Fall or spring. Credit variable. S-U grades optional. Prerequisite: permission of instructor. Students must register with an Independent Study form (available in 140 Roberts Hall.)
Hours to be arranged. Staff.
Undergraduate research projects in horticultural sciences.

HORT 500 Master of Professional Studies (Agriculture) Project
Fall or spring. 1–6 credits. (6 credits maximum toward MPS [Agriculture] degree). S-U grades optional.
Hours to be arranged. Graduate faculty.
A comprehensive project emphasizing the application of principles and practices to professional horticultural teaching, extension, and research programs and situations. Required of Masters of Professional Studies (Agriculture) candidates in the respective graduate fields of horticulture.

HORT 600 Seminar
Fall or spring. Credit variable. Open to graduate students only. Undergraduates should register for HORT 495. S-U grades only.
R 12:20. D. W. Krall and D. A. Rakow.
Graduate student participation in floriculture and ornamental horticulture departmental weekly seminar series.

HORT 602 Seminar in Fruit and Vegetable Science
Fall or spring. 1 credit. Required of graduate students majoring or minoring in pomology or vegetable crops. Limited to graduate students. S-U grades only.
R 4:30. H. C. Wien and I. A. Merwin.

[HORT 605 Current Topics in Floricultural and Ornamental Horticultural Physiology
Spring. Variable credit. Prerequisite: permission of instructor. Not offered 1992–93.
Hours to be arranged. Staff.
Discussions of modern concepts, research, and commercial problems as reflected in current horticultural literature.]

[HORT 615 Quantitative Methods in Horticultural Research
Spring. Weeks 1–9. 2 credits. Prerequisite: STATS 601, STATS 602 or permission of instructor. S-U grades only. Offered alternate years. Not offered spring 1993.
T R 10:10–12:05. D. W. Wolfe.
Advantages and limitations of conventional experimental designs and analyses of greenhouse and field (including-on-farm) experiments. Use and interpretation of plant growth analysis techniques. Discussions will include critical analysis of published data and research in progress.]

HORT 620 Woody Plant Physiology
Spring. 3 credits. BIO 242, BIO 331, CHEM 357, or equivalent, or permission of instructor. Offered spring 1993, 1994, then alternate years.
T R 8:30–9:55. M. P. Pritts and I. A. Merwin.
A detailed study of physiological processes in woody plants and how these processes influence crop production practices. Topics will include shoot and root growth, phytohormones, dormancy, photoperiodism, photosynthesis, respiration, carbon and nitrogen metabolism, water relations, and fruiting.

HORT 625 Advanced Postharvest Physiology of Horticultural Crops
Spring. 3 credits. Prerequisite: BIO S 242 and/or HORT 325. Offered alternate years.
Lecs, T R 10:10. Disc session to be arranged. P. M. Ludford.

Physiological and biochemical aspects of growth and maturation, ripening, and senescence of harvested horticultural plant parts. Topics include morphological and compositional changes during ripening and storage life, some physiological disorders, aspects of hormone action and interactions, and a consideration of control.

HORT 629 Special Topics in Plant Science Extension (also Plant Breeding 629)
Spring. 2 credits. Offered 1992 and alternate years.
F 1:25–4:25. W. D. Pardee.
Designed for graduate students and advanced undergraduates to provide a broader knowledge of cooperative extension philosophy and methods. Developed for students interested in extension and research in public and commercial organizations. Topics relate to extension in other countries as well as in the United States.

HORT 630 Current Topics in Postharvest Horticulture
Fall or spring. 1 credit. Prerequisite: permission of instructor.
Hours to be arranged. G. D. Blanpied.
Graduate students and staff report and discuss current topics in postharvest biology and technology of horticultural crops.

HORT 636 Current Topics in Horticulture
Fall or spring. 1 credit. S-U grades only.
1 hour per week, to be arranged.
I. A. Merwin.
A seminar series on current topics chosen by participating students and faculty, on a rotating basis. Format consists of weekly discussion groups, with each participant presenting at least one oral report based on independent reading and/or experimentation relating to the chosen topic. Interested students should contact the designated instructor(s) for each term.

HORT 700 Graduate Teaching Experience
Fall or spring. Credit variable. Open only to graduate students. Undergraduates should enroll in HORT 498. S-U grades optional. Prerequisite: permission of instructor.
Hours to be arranged. Staff.
Designed to give graduate students teaching experience through involvement in planning and teaching courses under the supervision of departmental faculty members. The experience may include leading discussion sections, preparing, assisting in, or teaching lectures and laboratories; and tutoring.

HORT 800 Thesis Research, Master of Science
Fall or spring. Credit to be arranged. S-U grades only.
Staff.

HORT 900 Thesis Research, Doctor of Philosophy
Fall or spring. Credit to be arranged. S-U grades only.
Staff.

INTERNATIONAL AGRICULTURE

INTAG 300 Perspectives in International Agriculture and Rural Development
Fall. 2 credits.
F 1:25–3:20. R. Everett.
A forum to discuss both contemporary and future world food issues and the need for an integrated, multidisciplinary team approach in helping farmers and rural development planners adjust to the ever-changing food needs of the world.

INTAG 402 Agriculture in Tropical America
Fall. 2 credits. Prerequisite: Upper class or graduate standing.
F 1:25–3:20. H. D. Thurston and staff.
A preparatory course for participation in International Agriculture 602. Physical resources, vegetation, history, crop and animal production, and various social and economic aspects of agriculture in tropical America will be discussed.

INTAG 403 Traditional Agriculture in Developing Countries
Fall. 1 credit. S-U only.
T 8–8:50. H. D. Thurston, D. Bates, A. Power, and T. Scott.
Today, perhaps over half of the world's arable land is farmed by traditional farmers. They developed sustainable agriculture practices which allowed them to produce food and fiber for millennia with few outside inputs. Many of these practices have been forgotten in developed countries but are still used by many traditional, subsistence, or partially subsistence farmers in developing countries. The course will examine traditional systems from several disciplinary points of view.

INTAG 414 Cultivation and Improvement of Cereal Crops
Spring. 1 credit. Prerequisite: An introductory biology or crops course (BIO S 101, HORT 102, SCAS 311 or equivalent) and SCAS/BIO S 473.
M W F 10:10. W. R. Coffman and M. E. Smith.
An introduction to the characteristics, culture, and improvement of important staple cereal crops of the tropics and sub-tropics with an emphasis on rice and maize. This is one of three 1-credit modules, including INTAG 416 and INTAG 418, each taught for one-third of the semester.

INTAG 416 Cultivation and Improvement of Root, Tuber, and Plantain Crops
Spring. 1 credit. Prerequisite: An introductory biology or crops course (BIO S 101, HORT 102, SCAS 311, or equivalent) and SCAS/BIO S 473.
M W F 10:10. H. D. Thurston.
An introduction to tropical root, tuber, and plantain crops, their importance, their culture, and their food, feed, and industrial uses. The cultural and socio-economic role of these crops in tropical societies will be considered, as well as the negative and positive aspects of their production and utilization. This is one of three 1-credit modules, including INTAG 414 and INTAG 418, each taught for one-third of the semester.

INTAG 418 Horticultural Crops in the Tropics
Spring. 1 credit. Prerequisite: An introductory biology or crops course (BIO S 101, HORT 102, SCAS 311 or equivalent) and SCAS/BIO S 473.
M W F 10:10. I. Merwin and E. Figueroa.
A survey of fruit and vegetable crops of economic and/or dietary importance in the tropics. The natural history of horticultural crops, major regions and methods of production, domestic and export marketing systems, and various technological, ecological, and social factors that affect tropical fruit and vegetable production will be emphasized. This is one of three 1-credit modules, including INTAG 414 and INTAG 416, each taught for one-third of the semester.

INTAG 599 International Agriculture and Rural Development Project Paper
Fall and spring. 1–6 credits. Limited to M.P.S. candidates in International Agriculture and Rural Development. S-U grades only.
Staff.

INTAG 602 Agriculture in the Developing Nations
Spring. 3 credits. Prerequisites: INTAG 300 or equivalent, INTAG 402, and permission of instructors. Cost of field-study trip includes air fare and approximately $450 for lodging, meals, and personal expenses.
T R 2:30–4:25 until midterm only. D. Lee and R. Blake.
Oriented to provide students an opportunity to observe agricultural development in a tropical environment and promote interdisciplinary exchange among staff and students. The two-week field-study trip during January to Latin American countries is followed by discussions and assignments dealing with problems in agriculture and livestock production in the context of social and economic conditions.

INTAG 603 Administration of Agricultural and Rural Development (also Government 692)
Spring. 4 credits.
M 2:30–5:30. N. T. Uphoff and L. W. Zuidema.
An intercollege course designed to provide graduate students with a multidisciplinary perspective on the administration of agricultural and rural development activities in developing countries. The course is oriented to students trained in agricultural and social sciences who are likely to occupy administrative roles during their professional careers.

INTAG 650 Special Topics in International Agricultural and Rural Development
Fall or spring. 1–3 credits
Staff.
A seminar on new themes of agricultural and rural development offered occasionally. Specific content varies each semester.

INTAG 685 Training and Development: Theory and Practice (also Communication 685, Education 685 and Industrial and Labor Relations 658)
Spring and summer. 4 credits. S-U grades optional. Charge for materials $45.
Lec, F 9:05–12:05; lab, 1 hour per week, to be arranged. At Communication Graduate Center. R. Colle, M. Ewert, W. Frank.
Analysis, design, and administration of training programs for the development of human resources in small-farm agriculture, rural health and nutrition, literacy as nonformal education, and general community development. Designed for scientists, administrators, educator-trainers, and social organizers in rural and agricultural development programs in the U.S. and abroad.

INTAG 703 Seminar for Special Projects in Agricultural and Rural Development
Fall and spring. 1 credit. Required for graduate students enrolled in the M.P.S. (Agr.) degree program and majoring in international agricultural and rural development; others with permission of the program director. S-U grades only.
M 12:20. H. D. Thurston and L. W. Zuidema.
The seminar provides students with the opportunity to present their special projects. It also serves as a forum for discussion of current issues in low-income agricultural and rural development, with particular attention to interdisciplinary complexities.

Related Courses in Other Departments

Introduction to Global Economic Issues (Agricultural Economics 100)

Economics of Agricultural Development (Agricultural Economics 464)

The World's Food (Agricultural Economics 660)

Microeconomic Issues in Agricultural Development (Agricultural Economics 664)

Seminar on Agricultural Trade Policy (Agricultural Economics 730)

Macro Policy in Developing Countries (Agricultural Economics 763)

[Tropical Livestock Production (Animal Science 400) Not offered 1992–93.]

[Tropical Forages (Animal Sciences 403) Not offered 1992–93.]

Southeast Asia Seminar: Country Seminar (Asian Studies 601 and 602)

Plants and Civilization (Biological Sciences 246)

Food, Agriculture, and Society (Biological Sciences 469)

Seminar in International Planning (City and Regional Planning 671)

[Science, Technology, and Development (City and Regional Planning 774) Not offered 1992–93.]

Intercultural and Development Communication (Communication 612)

Communication in the Developing Nations (Communication 624)

Comparative Studies in Adult Education (Education 483)

Planning Educational Systems (Education 678)

[Designing Extension and Continuing Education Programs (Education 681) Not offered 1992–93.]

Community Education and Development (Education 682)

International Food Science and Development (Food Science 403)

International Postharvest Food Systems (Food Science 447)

Political Economy of Change: Rural Development in the Third World (Government 648)

International Environmental Issues (Natural Resources 400)

Religion, Ethics, and the Environment (Natural Resources 407)

National and International Food Economics (Nutritional Sciences 457)

International Nutrition Problems, Policy, and Programs (Nutritional Sciences 680)

International Nutrition Seminar (Nutritional Sciences 698)

Special Topics in International Nutrition (Nutritional Sciences 699)

Introduction to Plant Breeding (Plant Breeding 201)

Plant Diseases in Tropical Agriculture (Plant Pathology 655)

Rural Sociology and International Development (Rural Sociology 205)

Comparative Issues in Social Stratification (Rural Sociology 370)

Gender Relations and Social Change (Rural Sociology 425)

Social Demography (Rural Sociology 438)

Population, Environment, and Development in Sub-Saharan Africa (Rural Sociology 495)

Contemporary Sociological Theories of Development (Rural Sociology 606)

The Political Economy of Policy and Planning in Third World States (Rural Sociology 725)

Production of Tropical Crops (Soil, Crop, and Atmospheric Sciences 314)

Properties and Appraisal of Soils of the Tropics (Soil, Crop, and Atmospheric Sciences 471)

Ecology of Agricultural Systems (Soil, Crop, and Atmospheric Sciences 473, and Biological Sciences 473)

LANDSCAPE ARCHITECTURE

P. J. Trowbridge, Program Coordinator; M. I. Adleman, P. H. Horrigan, T. H. Johnson, D. W. Krall, L. J. Mirin, R. T. Trancik, K. A. Wolf

LA 141 Freehand Drawing (also FR DR 111)
Fall. 3 credits. Each section limited to 25 students. S–U grades optional.
Studios, T R 9:05–11. P. H. Horrigan.
Developing ability in freehand observation drawing. Freehand still life, landscape, figure, and perspective drawing will be included. Weekly sketchbook assignments.

LA 142 Introduction to Landscape Architecture
Spring. 4 credits. Limited to approximately 20 students; freshman landscape architecture majors or permission of instructor. Cost of basic drafting equipment and supplies, about $200.
Lecs, T R 1:25; studio, T R 2:30–4:25. D. W. Krall.
Fundamentals of landscape design applied to residential and other small-scale site-planning projects. Work in the studio introduces course participant to the design process, design principles, construction materials, planting design, and graphics.

LA 201 Design, Composition, and Theory
Fall. 6 credits. Limited to landscape architecture majors. Cost of basic drafting equipment and supplies, about $200; expenses for field trip, about $200.
Lecs, M W F 1:25; studios. M W F 2:30–4:25. T. H. Johnson.
Basic design principles and processes applied to the design of the outdoor environment. Studio projects focus on the analysis, organization, and form of outdoor space through the use of three-dimensional components including structures, vegetation, and earthform.

LA 202 Design, Composition, and Theory
Spring. 6 credits. Prerequisite: LA 201 with a grade of C or better. Cost of supplies, about $200; expenses for field trip, about $200.
Lecs, M W F 1:25; studios, M W F 2:30–4:25. T. H. Johnson.
Site design and planning for parks, housing, and architectural ensembles. Basic theory, historic precedents, and the design process are correlated with garden landscapes, open-space systems, earth form, vegetation, and circulation systems.

LA 301 Site Design and Detailing
Fall. 6 credits. Prerequisite: LA 202 with a grade of C or better. Cost of supplies, about $200; expenses for field trip, about $200.
Lecs, M W F 1:25; studios, M W F 2:30–4:25. P. H. Horrigan.
Course participants will be engaged in the art and science of site-scaled design. This includes gardens, parks, and residential projects, their design and technical solutions.

LA 302 Site Design and Detailing
Spring. 6 credits. Prerequisite: LA 301 with a grade of C or better. Cost of supplies, about $200; expenses for field trip, about $200.
Lecs, M W F 1:25; studios, M W F 2:30–4:25. L. Mirin.
This studio will engage course participants in a wide range of site-scaled projects such as subdivision developments, street improvement projects, and gardens. Projects and associated detailing will build upon knowledge gained in LA 301.

LA 310 Site Engineering
Fall. 4 credits. Prerequisite: permission of instructor.
Lecs, studios, M W F 9:05–11. M. I. Adleman.
Lectures and studio projects focusing on the development of a working knowledge of site grading, earthwork, storm-water management, site irrigation, site layout, and road alignment.

LA 312 Site Construction
Spring. 4 credits. Prerequisite: permission of instructor.
Lecs, M W 9:05; studios, T R 9:05–11. P. J. Trowbridge.
Construction materials, specifications, cost estimates, and methods used by landscape architects in project implementation. The course includes lectures, studio problems, and development of construction documentation for a selected project.

LA 401 Urban Design and Planning
Fall. 6 credits. Prerequisites: LA 302 with a grade of C or better. Cost of supplies, about $200; basic expenses for field trip, about $200.
Lecs, M W F 1:25; studios, M W F 2:30–4:25. Required field trip. R. T. Trancik.
A sequence of projects introducing students to advanced skills in large-scale spatial design, and historic precedent in an urban context.

LA 402 Advanced Project Studio
Spring. 6 credits. Prerequisite: completion of LA 401 or the study abroad option with a grade of C or better. Cost of supplies and reproductions, about $200.

Lecs, M W F 1:25; studios, M W F 2:30–4:25. M. I. Adleman.
Site design and construction projects introduced as an evaluation of each student's professional competency in landscape architecture.

LA 411 Autocad
Fall or spring. 1–5 credits.
P. J. Trowbridge.
An introductory course in computer-aided design and drafting. Course participants will work on IBM PC AT work stations with instructional guidance. Auto-tutorial format for the course will give participants a demonstrated ability to problem-solve and generate increasingly complex graphic displays.

LA 412 Professional Practice
Spring. 1 credit.
Lec. M 11:15. K. Wolf.
Presents the student with a comprehensive understanding of the role of the professional landscape architect and the problems and opportunities one may encounter in an office or other professional situations. Topics discussed include practice diversity, marketing professional services, office and project management, construction management, computers in the profession, and ethics.

LA 480 Principles of Spatial Design and Aesthetics (also City and Regional Planning 481/581)
Fall. 3 credits. Course enrollment is restricted to Landscape Architecture and Planning students, or permission of instructor.
Lecs, M W 10:10; disc, F 10:10.
R. T. Trancik.
A lecture course that introduces the spatial and visual design vocabularies of cities. Aesthetic principles and theories of design are investigated for different types of urban spaces drawn from a variety of international examples, historic and modern. Included in the course are design methods and applications in the contemporary urban context of Europe and North America.

LA 490 Special Topics in Landscape Architecture
Fall or spring. 1–3 credits; may be repeated for credit. S-U grades optional.
Staff.
Topical subjects in landscape architectural design, theory, history, or technology. Group study of topics not considered in other courses.

LA 491 Design and Plant Establishment (also HORT 491)
Fall. 3 credits. Prerequisites: FOH 230 or permission of instructor.
Lecs, T R 12:20; studio, R 1:25–4:25.
N. Bassuk and P. Trowbridge.
This course will focus on the establishment of woody and herbaceous plants in urban and garden settings. By understanding the special constraints placed on plants, we will be able to critically assess and modify potential planting sites, select appropriate trees, shrubs, and ground covers for a given site, and learn about the principles and practices of plant establishment both in the ground and in contained environments. Design followed by specifications and graphic details will be produced to implement these practices. Techniques for tree preservation and land reclamation/revegetation will also be discussed.

LA 492 Undergraduate Seminar
Spring. 2 credits.
W 11:15. M. I. Adleman.
Examination of current topics related to the practice of landscape architecture.

LA 497 Independent Study in Landscape Architecture
Fall or spring. 1–5 credits; may be repeated for credit. Students must register with an Independent Study form (available in 140 Roberts Hall). S-U grades optional.
Staff.
Work on special topics by individuals or small groups.

LA 498 Undergraduate Teaching
Fall or spring. 1–3 credits. Prerequisites: previous enrollment in course to be taught and permission of instructor. Students must register with an Independent Study form (available in 140 Roberts Hall). S-U grade optional.
Hours to be arranged. Staff.
Designed to give qualified undergraduates experience through actual involvement in planning and teaching courses under the supervision of department faculty.

LA 501 Design, Composition, and Theory
Fall. 6 credits. Limited to graduate students. Cost of drafting supplies about $200. Field trip about $200.
T. Johnson.
Basic design principles and processes applied to the design of the outdoor environment. Studio projects focus on the analysis, organization, and form of outdoor space through the use of three-dimensional components including structures, vegetation, and earthform.

LA 502 Design, Composition, and Theory
Spring. 6 credits. Limited to graduate students. Cost of drafting supplies, about $200; expenses for field trip, about $200.
Lecs, M W F 1:25; studios, M W F 2:30–4:25. P. H. Horrigan.
The studio will focus on the spatial design of project-scale site development. Students will develop their expertise in applying the design theory, vocabulary, and graphic expression introduced in LA 501.

LA 505 Graphic Communication I
Fall. 3 credits. Prerequisites: concurrent enrollment in LA 501 or permission of instructor.
Lecs, T R 9:05; studios, T R 10:10–12:05.
T. Johnson.
Basic skills in graphic presentation, including pencil-and-ink drawing and drafting techniques applicable to landscape architecture projects. Freehand drawing, orthographic projection, axonometric projection, and lettering are covered in the course.

LA 506 Graphic Communication II
Spring. 3 credits. Prerequisites: LA 505 and concurrent enrollment in LA 502 or permission of instructor.
Lecs, W F 9:05–12:05. P. H. Horrigan.
Graphics studio focusing upon observation and freehand drawing color theory and technique, perspective, and analytical drawing.

***LA 520 Contemporary Issues in Landscape Architecture**
Fall. 2 credits.
L. Mirin.
*Offered through the College of Architecture, Art, and Planning.

***LA 521 History of American Landscape Architecture**
Fall. 3 credits.
L. Mirin.
*Offered through the College of Architecture, Art, and Planning.

***LA 522 History of European Landscape Architecture**
Spring. 3 credits.
L. Mirin.
*Offered through the College of Architecture, Art, and Planning.

LA 590 Graduate Seminar in Landscape Architecture
Spring only. 3 credits.
T R 11:15. T. Johnson.
Examination of current topics related to the practice of landscape architecture.

***LA 601 Project Planning and Application**
Fall. 6 credits. Limited to graduate students. Cost of supplies, about $200; expenses for field trip, about $200.
Lecs, M W F 1:25; studios, M W F 2:30–4:25. Required field trip. L. Mirin.
Course participants are engaged in the analysis and design of numerous types of projects at the site scale. Projects include parks, housing projects, and commercial programs.

*Offered through the College of Architecture, Art and Planning.

LA 602 Urban Design and Planning (also City and Regional Planning 555)
Spring. 6 credits. Limited to graduate students. Cost of supplies, about $200; expenses for field trip, about $200.
Lecs, M T R 1:25; studios, M T R 2:30–4:25.
R. T. Trancik and staff.
Application of urban-design and town-planning techniques to specific contemporary problems of city environments. Issues of urbanism are investigated and applied to physical design interventions and spatial typologies involving the street, square, block, garden, and park systems. Urban land-use development and public and private implementation of urban-design plans are examined. This is a specially arranged collaborative studio with the Department of City and Regional Planning.

LA 610 Site Engineering
Fall. 4 credits. Prerequisite: permission of instructor.
Lec, studios, M W F 9:05–11.
M. I. Adleman.
Lectures and studio projects focusing on the development of a working knowledge of site grading, earthwork, storm-water management, and road alignment.

LA 612 Site Construction
Spring. 4 credits. Prerequisite: permission of instructor.
Lecs, M W 9:05; studios, T R 9:05–11.
P. J. Trowbridge.
Construction materials, specifications, cost estimates, and methods used by landscape architects in project implementation. The course includes lectures, studio problems, and development of construction documentation for a selected project.

LA 680 Graduate Seminar in Landscape Architecture
Fall or spring. 1–3 credits. May be repeated for credit. Limited to graduate students. S-U grades optional.

Staff.
Topical subjects in landscape architectural design, theory, history, or technology. Seminar topics and group study not considered in other courses.

LA 701 Natural Systems and Planting Design Studio
Fall. 6 credits. Limited to graduate students. Cost of drafting supplies, about $200; expenses for field trip, about $200.
Lecs, M T R 1:25; studios, M T R 2:30–4:25. Required field trip. P. J. Trowbridge and D. Krall.
An application of design and planning methods within large physiographic or political units. Course participants will be engaged in the use of soil maps, aerial photographs, remote-sensed images, census data, and techniques for manipulating large, complex data bases. The course focuses on plant communities.

LA 800 Master's Thesis in Landscape Architecture
Fall or spring. 9 credits.
Hours to be arranged. Staff.
Independent research, under faculty guidance leading to the development of a comprehensive and defensible design or study related to the field of landscape architecture. Work is expected to be completed in final semester of residency.

NATURAL RESOURCES

J. P. Lassoie, chair; R. A. Baer, M. B. Bain, B. L. Bedford, D. J. Decker, T. J. Fahey, T. A. Gavin, J. W. Gillett, J. Jacobson, J. W. Kelley, B. A. Knuth, M. E. Krasny, C. C. Krueger, R. A. Malecki, R. J. McNeil, A. N. Moen, R. T. Oglesby, M. E. Richmond, C. L. Schofield, R. Slothower, C. R. Smith, L. H. Weinstein, B. T. Wilkins, J. B. Yavitt, W. D. Youngs

NTRES 100 Principles of Conservation
Fall. 3 credits. Limited to students specializing in natural resources or with permission of instructor.
Lecs, M W F 9:05; 1-hr disc to be arranged. R. T. Oglesby.
The nature of natural resources, how they are managed, and their interactions with individuals and societies are considered. Case histories are used to illustrate both principles and practices. Emphasis will be on management of renewable resources based on ecological and cultural perspectives.

NTRES 107 Introduction to Resource Management
Spring. 3 credits.
Lec, T 10:10; lab, T or R 2:30–5. B. T. Wilkins.
Management of wildlife, fishery, and forest resources is explored with the assistance of common computer applications. Laboratory sessions enhance writing and analysis of data in DOS and Macintosh Environments. Several hours are required each week outside of class to complete succinct and increasingly complex result and conclusion assignments.

NTRES 201 Environmental Conservation
Spring. 3 credits.
Lecs, M W F 12:20; 1-hr disc to be arranged. T. J. Fahey.
A survey course intended for students in any year and major as an aid to understanding the major environmental problems facing spaceship Earth. A topical approach with representative case histories is taken. Topics include global climate change; population growth and world hunger; energy resources and alternatives; mineral resources and recycling; land use in urban and rural landscapes; air, water, and soil pollution; and endangered species and wildlands.

NTRES 210 Introductory Field Biology
Fall. 4 credits. Limited to 45 students. Open to sophomores and juniors with an adviser in Natural Resources or by permission of instructor. Prerequisites: BIO S 101 and 102 or equivalent. Cost of field trips, approximately $10.
Lec, W 9:05; labs, M W 1:25–4:25. 2 overnight field trips required. T. A. Gavin.
Introduction to methods of inventorying, identifying, and studying plants and animals. Students are required to learn the taxonomy, natural history, and how to identify approximately 150 species of vertebrates and 75 species of woody plants. Selected aspects of current ecological thinking are stressed. The interaction of students with biological events in the field and accurate recording of these events are emphasized.

NTRES 215 Environmental Disruption and Regulation
Summer. 3 credits. Open to high school students.
Lecs, M W 6:30–9:30 p.m. M. Heiman.
The physical and social context of human-environmental interrelations in advanced industrial societies. Interest-group positions and the United States regulatory response on air and water pollution; toxic, nuclear, and solid waste management; and workplace hazards. The conflicts and compatibility of economic growth, social justice, and environmental quality under capitalism.

NTRES 218 Science and Politics at Toxic Waste Sites
Summer. 3 credits. Prerequisites: one semester course in a science or equivalent work experience. Open to high school students with permission of instructor.
Lecs, M-F 6:15–7:30 p.m. and 8:15–9:30 p.m. S. M. Penningroth and J. W. Gillett.
This course emphasizes an interdisciplinary, integrative approach to assessing and remediating contamination due to toxic waste. Topic areas include basic principles of toxicology, federal policy under Superfund, cleanup technologies, and risk perception. Information is consolidated through specific case studies. Two field trips are planned to hazardous waste sites in New York State.

[NTRES 230 Food, Population, and the Environment
Summer. 3 credits. Not offered 1992–93.
Lecs, M-F 10–11:15. G. M. Berardi and M. Heiman.
The social and environmental relationships between human populations and their resource base. Topics include: protection and use of environmental systems (rural, forest, water, soil); personal nutrition and the impact on global resources; limits to growth and family planning; political contexts of famines and natural hazards. Case studies from Africa, Asia, and Latin America.]

NTRES 250 Introduction to Wildlife Biology
Spring, first third of term. 1 credit.
Lecs, M W F 10:10. Staff.
An introduction to biological topics relevant to informed management of wildlife; emphasis will be on the population as the unit of interest. An overview of the history of wildlife management in North America will illustrate the importance of the interaction between biological and nonbiological factors on wildlife. However, this course is about wildlife biology, not wildlife management, which is treated in Natural Resources 308 and 410.

NTRES 251 Introduction to Fishery Biology
Spring, weeks 6–10. 1 credit.
Lecs, M W F 10:10. Staff.
Subject areas that form the basis of fishery biology are introduced by staff member working in that particular area. The areas included are limnology, insect biology, biology of fishes, genetics, life history, population biology, environmental impacts, policy, and management.

NTRES 252 Introduction to Forest Science
Spring, last third of term. 1 credit. Prerequisite: NTRES 210 or permission of instructor.
Lecs, M W F 10:10. Staff.
Appreciation of forests as a natural resource. Introduction to the importance of ecology, tree biology, and environment as bases for forest management and silviculture. Emphasis is on the forests of the northeastern United States.

NTRES 270 Conservation of Birds
Spring. 2 credits.
Lec, T R 11:15–12:05. C. R. Smith.
A course for majors and nonmajors, focusing on bird conservation and management at the organism, population, community and landscape levels. Current resource management issues relevant to birds will be explored in the contexts of agricultural practices, habitat management, tropical deforestation, the design and management of natural preserves, endangered species management, global climate change and the economic importance of bird study as an outdoor recreational activity.

NTRES 271 Conservation of Birds Laboratory
Spring. 1 credit. Concurrent enrollment in NTRES 270 required. Limited to NTRES majors.
At least six required Saturday-morning field trips plus four indoor labs. C. R. Smith.
A field-oriented course designed to teach skills of bird observation and identification based on the integration of field marks, songs and calls, and habitat cues. Topics covered will include the choice and effective use of field guides, binoculars, and other aids to bird identification; procedures for taking and organizing field notes; the relationships of birds to their habitats and to other birds; and methods and procedures for censusing and surveying songbird populations. Students are required to provide their own binoculars for field use.

NTRES 301 Forest Ecology
Fall. 3 credits. Prerequisite: Introductory Biology.
M W F 11:15. T. J. Fahey.
A comprehensive analysis of the distribution, structure, and dynamics of forest ecosystems. Topics include paleoecology of forests, ecophysiology of forest trees, disturbance, succession and community analysis, primary productivity, and nutrient cycling.

NTRES 302 Forest Ecology Laboratory
Fall. 1 credit. Cost of weekend trip approximately $30. Concurrent enrollment in NTRES 301 required.
M 1:25–4:25. Optional weekend trips. T. J. Fahey.
Field trips designed to familiarize students with the nature of regional forests and to provide experience with approaches to quantifying forest composition and its relation to environmental factors. Optional weekend field trips to Adirondacks and White Mountains, New Hampshire. Group research projects in local forests.

NTRES 303 Woodlot Management
Fall. 3 credits. Letter grades only.
Lecs, T R 10:10; lab, R 12:20–4:25. J. W. Kelley.
A practical, field-oriented course emphasizing multiple purpose management of small nonindustrial private forestland in the northeastern United States.

NTRES 304 Wildlife Ecology
Spring. 3 credits. Prerequisites: good background in biology; this course is intended primarily for juniors and seniors.
Lec, M W F 11:15. Two weekly 2-hour labs to be arranged. A. Moen.
This course focuses on the physiological, behavioral, and population characteristics of wild species, interactions among species, and their relationships with range characteristics and resources. Computer modeling is an integral part of the course.

NTRES 305 Maple Syrup Production
Spring. 2 credits. Limited to 20 students. Prerequisite: permission of instructor required. Letter grades only.
Lecs, T R 10:10; lab, R 12:30–4:30 (during sap season). J. W. Kelley.
Students work in most phases of the Arnot Forest maple operation and learn modern sap collecting, processing, and quality control in producing maple syrup.

NTRES 306 Coastal and Oceanic Law and Policy
Summer. 2 credits. A special 1-week course offered at Cornell's Shoals Marine Laboratory (SML), on an island off Portmouth, N.H. For more details and an application, consult the SML office, G14 Stimson Hall. Estimated cost (includes tuition, room and board, and ferry transportation), $725.
Daily lecs and discs for 1 week. SML faculty.
Intended for persons interested in careers in management of marine or coastal resources or in the natural sciences. Subjects include law and policy related to ocean dumping, marine sanctuaries, environmental impact statements, water and air pollution, fisheries management, offshore gas and oil production, and territorial jurisdiction. Lectures on the status and history of law are accompanied by discussion of relevant policy and efficacy of various legal techniques. A case study that requires extensive use of the laboratory's library and personnel is assigned. The week concludes with a mock hearing.

NTRES 308 Natural Resources Management
Fall. 3 credits. Prerequisite: junior standing; introductory ecology or permission of instructor.
M W F 10:10. B. A. Knuth.
Management of natural resources with a focus on fish, wildlife, forest, and water resources. Emphasis is on concepts necessary to formulate and achieve specific management goals and objectives. Topics include an overview of natural resource planning processes and the management cycle; and organismal, environmental, social, and institutional dimensions of management. Focus includes management in the public domain and public-private partnerships. Students will be assigned one case study issue for the term, on which all written and oral assignments will build. Grades are based on both individual and group performance.

NTRES 400 International Environmental Issues
Fall. 4 credits. Limited to 30 students. Prerequisite: junior standing or above.
Lecs, T R 10:10–12:05. R. J. McNeil.
International aspects of the preservation and development of environmental and natural resources. Concepts include development, resource ownership, exploitation, compensation, and preservation. Cultural differences in attitudes and behavior toward environment. Management practices under different cultural, economic, and social systems. Will cover current issues such as acid precipitation; management of migratory whales, fish, and waterfowl; Antarctic development; global climate and energy issues; and preservation of tropical rainforests and endangered species. Lecture and discussion, term paper, and examinations. Priority to: seniors, a few graduate students, others providing best mix of backgrounds, others with special needs, natural resources majors.

NTRES 401 Environmental and Natural Resources Policies
Fall or spring. 3 or 4 credits. Prerequisites: junior standing and participation in Cornell-in-Washington Program.
Lab to be arranged. R. J. McNeil and staff.
Concepts and principles fundamental to the environmental policy process. Biological and ecological principles central to decision making in the natural resources arena, particularly at the national and international levels. Role of the legal system in the policy process; roles of citizen organizations, lobbyists, bureaucrats, legislators. Case studies, interviews with Washington officials, several short papers, one exam. A fourth credit available requires a more extensive written assignment and an oral presentation.

NTRES 402 Natural Resources Policy, Planning, and Politics
Spring. 3 credits. Prerequisites: junior standing and permission of instructor.
Lec, January 2-week intersession; one 2-hr. orientation session in Dec. and four 2-hr. seminars in Jan. and Feb. R. J. McNeil and staff.
An introduction to the environmental policy process and its conceptual framework. Recognition of phenomena identified as natural resources or environmental problems and issues; steps leading to legislation or regulations to solve problems; implementation and evaluation stages; role of the legal system; roles of citizens, lobbyists, government actors. Case studies; presentations by and discussions with about twenty prominent Washington policy makers appearing as guest lecturers. Required interviews, term paper, oral reports. Several meetings in Ithaca before and after intensive January session in Washington.

[NTRES 406 Conducting Marine and Natural Resource Extension Programs
Spring. 3 credits. Offered alternate years. Not offered 1992–93.
Lec and rec. One weekend field trip. B. T. Wilkins.
Extension programs stimulate and help citizens use current research knowledge to reach decisions on the management of natural resources. The course provides an overview of the constructs used in this emerging natural resource field, and gives students experience in components important in conducting such efforts.]

NTRES 407 Religion, Ethics, and the Environment
Spring. 3 credits. For juniors, seniors, and graduate students; others by permission only. S-U grades optional.
T R 9:05, 1-hr. disc to be arranged. R. A. Baer.
A study of how religion (mainly Christianity and Judaism), philosophy, and ethics affect our understanding and treatment of nature. Terms like religion, value, knowledge, nature, and the public interest are examined in detail. Particular themes include the structure of modern science, the nature of moral claims, sin and salvation, human finitude and death. Also, animal rights; responsibility to future generations; anthropocentric, biocentric, and theocentric views of human beings and nature.

NTRES 408 Resource Management and Environmental Law
Spring. 3 credits. For juniors, seniors, and graduate students. S-U grades optional.
Lecs, T R 10:10–12. H. Carter, Jr.
A senior-level course that introduces the use of legal concepts, doctrines, and remedies in natural resource and environmental management. For a variety of living resources and their habitats, it explores the common law and regulatory processes available for resolving conflicts between exploitation and protection and stresses a practical understanding of how public and private values, economic considerations, and constitutional limitations affect management techniques and objectives.

NTRES 409 Resource Management in Yellowstone
Summer. 3 credits. Prerequisite: permission of instructor.
Two weeks on-site at Yellowstone in early June. To be arranged. B. T. Wilkins.
A two-week, on-site exploration of the management of wildlife and other resources in Montana and Wyoming portions of the Northern Yellowstone ecosystem. Selected vegetative types and associated vertebrates will be considered, as well as various management agencies important to the Northern Yellowstone ecosystem. Differences from Northeastern situations will be stressed. A paper on a mangement issue will be developed and presented in one of two evening meetings during the following fall.

NTRES 410 Wildlife Management Concepts and Applications
Spring. 3 credits. Prerequisites: introductory biology, NTRES 304 (Wildlife Ecology) desirable. Junior, senior, graduate level standing.
M W F 9:05. Two weekly 2-hour labs to be arranged. A. N. Moen.
In-depth analyses of the ecological basis for decision making in wildlife management,

computer simulations of management problems and effects of options, and preparation of management information systems.

NTRES 417 Wetland Resources
Summer. 2 credits. Prerequisite: one year of college biology. A special 1-week course offered at Cornell's Shoals Marine Laboratory (SML), on an island off Portmouth, N.H. For more details and an application, consult the SML office, G14 Stimson Hall. Estimated cost (includes tuition, room and board, and ferry transportation), $725.
Daily lecs, labs, and fieldwork for 1 weeks. SML faculty.
An examination of coastal and adjacent freshwater wetlands from historic, destruction, and preservation perspectives, including fresh- and salt-marsh ecology and management. Field trips to selected examples of the wetlands under discussion and follow-up laboratories emphasize successional features, plant identification and classification, and examination of the dominant insect and vertebrate associations.

NTRES 420 Introduction to Geographic Information Systems
Fall. 3 credits. For juniors, seniors and graduate students. Limited to 40 students. Prerequisite: familiarity with computers.
Lecs, T R 9:05; lab, M or T 1:25–4:25. R. Slothower.
This course will provide a comprehensive overview of the use and management of GIS as well as provide hands-on experience with GIS for diverse applications. The course conveys the geographic and analytical skills necessary to define and resolve spatial information problems.

NTRES 438 Fishery Management
Spring. 3 credits.
Lecs, T R 8 plus discs. C. C. Krueger.
Introduction to management as an adaptive process that focuses on achievement of goals. Coverage includes sport and commercial fisheries. Topics include setting goals and objectives, regulations, habitat management, population control, stocking, and management of trout, reservoirs, the Great Lakes, and Pacific halibut. Ecological, social, political, and economic aspects of those topics are discussed.

NTRES 440 Fishery Science
Fall. 3 credits. For juniors and seniors majoring in fishery science; others by permission of instructor. Prerequisites: a year of statistics and calculus. Offered alternate years.
M W F 12:20. W. D. Youngs.
Principles and theories involved in dynamics of fish populations. Methods of obtaining and evaluating statistics of growth, population size, mortality, yield, and production are considered.

[NTRES 442 Techniques in Fishery Science
Fall. 5 credits. Limited to 15 upperclass and graduate fishery students. Cost of field trips, no more than $30. Not offered 1992–93.
T R 1:25–4:25; 1 or more weekend field trips. C. C. Krueger.
Emphasis is on methods of collecting data on attributes of fish populations and their habitat. Topics include passive and active fish-capture methods, tagging and marking, and physical and chemical habitat measurements. Assumptions and limitations inherent in data sets, research planning, and scientific report writing are also discussed. Several field trips provide hands-on experience in data collection on streams and lakes.]

NTRES 450 Conservation Biology
Fall. 3 credits. Prerequisite: written permission of instructor required.
Lec, T 10:10–12:05; disc, R 10:10 or 11:15. T. A. Gavin.
Biological topics important to the maintenance of biological diversity will be emphasized. Examples include population viability analysis, and the analysis of the demography and genetics of small populations as they are affected by habitat fragmentation and isolation. Students will gain thorough familiarity with these concepts and their potential application through lectures, discussion, and interaction with computer models.

NTRES 493 Research in Policy and Human Studies in Natural Resource Management
Fall or spring. Credit to be arranged. Prerequisite: permission of instructor. Students must register with an Independent Study form (available in 140 Roberts Hall). S-U grades optional.
R. A. Baer, D. J. Decker, B. A. Knuth, R. J. McNeil, B. T. Wilkins.

NTRES 494 Research in Fishery Science
Fall or spring. Credit to be arranged. Students must register with an Independent Study form (available in 140 Roberts Hall). S-U grades optional.
Hours to be arranged. M. B. Bain, C. C. Krueger, R. T. Oglesby, C. L. Schofield, W. D. Youngs.

NTRES 495 Research in Wildlife Science
Fall or spring. Credit to be arranged. Prerequisite: permission of instructor. Students must register with an Independent Study form (available in 140 Roberts Hall). S-U grades optional.
T. A. Gavin, R. A. Malecki, A. N. Moen, M. E. Richmond, C. R. Smith.

NTRES 496 Research in Forestry
Fall or spring. Credit to be arranged. Students must register with an Independent Study form (available in 140 Roberts Hall). S-U grades; letter grade by permission of instructor.
Hours to be arranged. T. J. Fahey, M. E. Krasny, J. P. Lassoie, L. H. Weinstein.

NTRES 498 Teaching in Natural Resources
Fall and spring. 1–4 credits. Prerequisite: permission of instructor. Students must register with an Independent Study form (available in 140 Roberts Hall).
Staff.
Course designed to give students an opportunity to obtain teaching experience by assisting in labs, field trips for designated sections, discussions, and grading. Students will gain insights into the organization, preparation, and execution of course plans through application and discussions with instructor.

NTRES 500 Professional Projects—M.P.S.
Fall and spring. Credit to be arranged. Limited to graduate students working on professional master's projects. S-U grades only.
Staff.

NTRES 601 Seminar on Selected Topics in Fishery Biology
Fall or spring. 1 credit. S-U grades optional.
Hours to be arranged. Staff.

NTRES 604 Seminar on Selected Topics in Resource Policy and Management
Fall. 2 credits. S-U grades optional.
Hours to be arranged. Staff.
Primarily for graduate students with a major or minor in resource policy and management and upper level undergraduates with a strong interest in resource policy analysis. Topics vary with staff involved. Emphasis is placed on discussion, faculty-student interaction, communication skills, and current resource policy issues.

NTRES 606 Marine Resources Policies
Spring. 2 credits. Prerequisite: at least one related course such as NTRES 308, 438; or permission of instructor. S-U grades optional. Offered alternate years.
W 1:30–3:30. B. T. Wilkins.
A seminar discussing the law and issues concerning current marine policy questions such as coastal zone management, marine fish conservation, marine mammal protection, and wetland preservation.

[NTRES 607 Ecotoxicology (Toxicology 607)
Spring. 3 credits. Prerequisites: graduate or senior status and two 300-level courses in chemistry, biochemistry, or toxicology. Offered alternate years. Not offered 1992–93.
Lecs, M W F 11:15. J. W. Gillett.
Lectures, readings, and special guests focus on the principles of effects of toxic chemicals on natural ecosystems, their components, and processes. Major topics include fate and transport of chemicals (chemodynamics), comparative biochemical toxicology, ecosystem process analysis, simulation through mathematical and physical (microcosm) models, and relationships to regulation and environmental management.]

NTRES 608 Resource Policy and Administration
Fall. 3 credits. Prerequisite: graduate standing; juniors and seniors with instructor's permission.
T R 2:30–3:45. B. A. Knuth.
An examination, through lectures, readings, and discussions, of policy, decision making, and administration relating to natural resource management. Emphasis is on concepts relevant to policy formulation, implementation, and evaluation with specific applications from fisheries, wildlife, forest and water resource management. Topics include environmental policy makers, bureaucracies and organizational effectiveness, professionalism and ethics, resource policy philosophies, and problem-solving and decision aids including public involvement, conflict resolution, benefit/cost analysis, group decision processes, and program evaluation.

NTRES 610 Conservation Seminar
Fall and spring. No credit. All graduate students in natural resources are expected to participate.
Hours to be arranged. Staff.

NTRES 611 Seminar in Environmental Ethics
Fall. 3 credits. For graduate students, seniors, and juniors. S-U grades optional.
W 1:25–3:50. R. A. Baer.
Moral concerns relative to agriculture and/or the environment. In successive years, the

seminar will focus on such topics as (1) natural resources management and the concept of the public interest, (2) doing environmental ethics in a democratic and pluralistic society, (3) land use ethics, and (4) animal rights and animal welfare.

NTRES 612 Wildlife Science Seminar
Fall and spring. 1 credit. Prerequisite: permission of instructor. S-U grades optional.
Hours to be arranged. Wildlife science faculty.
Discussion of individual research or current problems in wildlife science.

[NTRES 615 Seminar in Agroforestry
Spring. 2 credits. Prerequisites: senior or graduate standing and permission of instructor. S–U option. Offered alternate years. Next offered in 1994.
Lec, F 2:30–4:25. J. P. Lassoie.
An interdisciplinary course intended to introduce students to the general principles and types of agroforestry systems. Agronomic, forestry, socioeconomic, and institutional factors are considered through the use of case studies. Conceptual and methodological approaches to agroforestry research design and program development are stressed. A presentation during the seminar and a library research paper are required of all enrolled.]

NTRES 616 Forest Science and Management Seminar
Fall/spring. 1 credit. Permission of instructor.
Hours to be arranged. Forest Science faculty.
Selected readings and discussions of research and/or current problems in forest science and management.

NTRES 620 Applications of Geographic Information Systems
Spring. 3 credits. Limited to 15 students. Prerequisite: NTRES 420 or equivalent. S-U grades optional. Possible field trip to commercial GIS facility.
Lec, W 9:05; lab, TBA. R. Slothower.
Use of GIS techniques to resolve issues involving geographic information within diverse disciplines. Students design, complete, and present the spatial analysis of a problem within their field of study. Lectures, readings, and discussions address advanced topics in spatial analysis, modeling, and databases. Emphasis will include the integration of natural resource information into spatially oriented projects.

NTRES 698 Current Topics: Environmental Toxicology (Toxicology 698)
Fall, spring. 1–3 credits. Prerequisites: graduate or senior standing in scientific discipline.
Time, date to be announced. Staff.
A student-faculty colloquium on subjects of current interest, usually focusing on multidisciplinary aspects of topical problems (e.g., Superfund, oil spills).

NTRES 800 Master's Thesis Research
Fall and spring. Credit to be arranged. Limited to graduate students working on master's thesis research. S-U grades only.
Staff.

NTRES 900 Ph.D. Thesis Research
Fall and spring. Credit to be arranged. Limited to graduate students working on Ph.D. thesis research. S-U grades only.
Staff.

Related Courses in Other Departments
See department advisers and curriculum materials for information about other related courses.

Environmental Policy (Agriculture and Life Sciences 661, Biological Sciences 661, and Biology and Society 461)

Resource Economics (Agricultural Economics 100, 252, 332, 452, 631, 651, 652, 750)

Functional Ecology: How Animals Work (Biological Sciences 272)

Function and Comparative Morphology of Vertebrates (Biological Sciences 274)

Limnology: Ecology of Lakes (Biological Sciences 457)

Mammalogy (Biological Sciences 471)

Ornithology (Biological Sciences 475)

Biology of Fishes (Biological Sciences 476)

Insect Biology (Entomology 212)

Public Administration (City and Regional Planning 643)

Policy Analysis (City and Regional Planning 720)

Soil Science (Soil, Crop, and Atmospheric Sciences 260, 361)

International Development (City and Regional Planning 777, Government 648)

Environmental Planning Law (Law 660, City and Regional Planning 653, 656)

Political Economy and Political Theory (City and Regional Planning 719, Government 428)

Philosophy 381—Philosophy of Science

PLANT BREEDING

W. R. Coffman, chair; R. E. Anderson, E. D. Earle, H. L. Everett, M. M. Kyle, C. C. Lowe, H. M. Munger, R. P. Murphy, M. A. Mutschler, W. D. Pardee, O. H. Pearson, R. L. Plaisted, M. E. Smith, M. E. Sorrells, J. C. Steffens, S. D. Tanksley, D. R. Viands, D. H. Wallace, R. W. Zobel

Biometry courses are listed under "Statistics and Biometry."

PL BR 201 Introduction to Plant Breeding
Spring. 2 credits. Prerequisite: one year of introductory biology.
Lecs, T R 11:15. W. R. Coffman.
The contributions of plant breeding to national and international development. An overview of genetics, breeding methods, systems, and operational procedures for producing commercial crop varieties are considered along with the major breeding objectives.

[PL BR 225 Plant Genetics
Spring. 4 credits. Prerequisite: one year of introductory biology or permission of instructor. Limited to 50 students. Offered alternate years. Not offered 1992–93.
Lecs, M W F 9:05; lab, T or W 1:25; lab section assignments at first lecture. Labs start first week. M. A. Mutschler.
An overview of genetic principles as related to the plant sciences. Topics covered include mitosis and meiosis, gamete production, Mendelian inheritance, linkage and mapping, gene interaction, DNA as genetic material, genetic fine structure and gene regulation, gene recombination, extranuclear inheritance, environmental effect on phenotypic expression, gene mutation and chromosomal aberrations, variation in chromosome numbers or structure, tissue culture, and genetic engineering of higher plants. Students conduct an independent inheritance project with *Brassica campestris*. The course may not be used to fulfill the genetics requirement for students in the Division of Biological Sciences.]

PL BR 401 Plant Cell and Tissue Culture
Fall. 3 credits. Prerequisites: a course in plant biology, cell biology, or genetics, or permission of instructor.
Lecs, T R 10:10. E. D. Earle.
Lectures and demonstrations dealing with the techniques of plant tissue, cell, protoplast, embryo, and anther culture and the applications of those techniques to biological and agricultural studies. Methods for plant improvement via manipulations of cultured cells will be discussed. Five written assignments and a term paper are required.

PL BR 402 Plant Tissue Culture Laboratory
Fall. 1 credit. Enrollment limited. Prerequisites: PL BR 401 (may be taken concurrently) and written permission of instructor.
W 1:25–4:25 plus 1 hr. to be arranged, alternate weeks. E. D. Earle.
Laboratory exercises complementing Plant Breeding 401. Techniques for establishing, evaluating, and utilizing plant organ, tissue and cell cultures will be covered. Experiments will use a broad range of plant materials.

PL BR 496 Internship in Plant Breeding
Fall or spring. Credits variable, may be repeated to a maximum of 6. Minimum of 60 on-the-job hours per credit granted. Prerequisites: permission of adviser and enrollment during the pre-enrollment period of the semester before the internship. Student must be a plant breeding junior or senior with a minimum 3.0 average in plant breeding courses. Students must attach to their course enrollment materials a "CALS Independent Study, Research, Teaching, or Internship" form signed by the faculty member who will supervise their study and assign their credits and grade. S-U grades only.
Staff.
On-the-job learning experience under the supervision of professionals in a cooperating organization. A learning contract is written between the faculty supervisor and student, stating the conditions of the work assignment, supervision, and reporting.

PL BR 497 Special Topics for Undergraduates
Fall or spring. Credits variable, may be repeated to a maximum of 6. Prerequisite: permission of instructor. Students must register with an Independent Study form (available in 140 Roberts Hall). S-U optional.
Staff.

PL BR 498 Undergraduate Teaching
Fall or spring. Credits variable, may be repeated to a maximum of 6. Prerequisites: permission of instructor, and previous enrollment in course to be taught or equivalent. Students must register with an Independent Study form (available in 140 Roberts Hall). S-U optional.

Staff.
Undergraduate teaching assistance in a plant breeding course. Teaching experience may include leading a discussion section, preparing and teaching laboratories, and tutoring.

PL BR 499 Undergraduate Research
Fall or spring. Credits variable, may be repeated to a maximum of 6. Prerequisite: permission of instructor. Students must register with an Independent Study form (available in 140 Roberts Hall). S-U optional.
Staff.
Undergraduate research projects in plant breeding.

PL BR 603 Methods of Plant Breeding
Fall. 3 credits. Prerequisites: BIO S 281 or PL BR 225 or equivalent and an introductory course in crop production.
M W F 9:05. M. E. Smith.
Breeding methods, systems, and operational procedures for producing commercial crop varieties are considered in detail. Emphasis is on an integrated, interdisciplinary approach to major breeding objectives, including agronomic characteristics, quality characteristics, and biotic and abiotic tolerances. Inbreeding methods, population genetics, population improvement, and breeding methods for special situations will be covered.

PL BR 604 Methods of Plant Breeding Laboratory
Fall. 2 credits. Prerequisite: PL BR 603 or equivalent (may be taken concurrently).
T R 1:25–4:15. M. E. Sorrells and R. E. Anderson.
Field trips to plant breeding programs involve discussion of breeding methods used, overall goals, selection and screening techniques, and variety and germ plasm release. Additional labs include use of computers in plant breeding research and selection techniques for disease resistance. For a term project each student designs a comprehensive breeding program on a chosen crop.

PL BR 605 Physiological Genetics of Plant Adaptation and Yield
Spring. 1 credit. Prerequisite: genetics or plant breeding, or permission of instructor.
T R 10:10. D. H. Wallace.
The physiology and genetics of yield accumulation and of cultivar adaptation are explored. Biological relationships between adaptation and yield are studied. Early and modern literature on breeding for adaptation and yield in any environment are compared.

PL BR 606 Advanced Plant Genetics
Spring. 3 credits. Prerequisites: BIO S 281, PL BR 225, or equivalent. S-U grades optional.
Lecs, T R 10:10–11:25. M. M. Kyle.
This course provides an advanced survey of genetics in higher plants. Topics include genetic analysis of developmental and metabolic processes, cytogenetics, mating behavior and barriers, and aspects of population and quantitative genetics.

PL BR 608 Biochemical Approaches in Plant Breeding
Fall. 3 credits. Prerequisite: BIO S 330, 331, or permission of instructor.
Lecs, M W 11:15; lab, W 7:30–10:30 p.m.
J. C. Steffens.
A review of biochemical, spectroscopic, and immunological techniques used in the analysis, selection, and generation of crop plants. Examples from current literature and possible applications of new technologies will be discussed. Laboratory will emphasize biochemical techniques used in plant breeding programs. Students should expect to spend more hours in laboratory than suggested by the formal meeting times.

PL BR 622 Seminar
Fall or spring. 1 credit. S-U grades only.
T 12:20. Staff and graduate students.

[PL BR 629 Special Topics in Plant Science Extension
Spring. 2 credits. Not offered 1992–93.
F 1:25–4:25. W. D. Pardee.
Designed for graduate students and advanced undergraduates to provide a broader knowledge of cooperative extension philosophy and methods. Developed for students interested in extension and research in public and commercial organizations. Topics relate to extension in other countries as well as in the United States.]

PL BR 650 Special Problems in Research and Teaching
Fall or spring. 1 or more credits. Prerequisite: permission of instructor supervising the research or teaching.
Staff.

PL BR 653.2 Plant Biotechnology (also Biological Sciences 653.2 and Plant Pathology 663)
Fall. 1 credit. Prerequisite: BIO S 653.1 or permission of instructor. S-U grades optional.
Lecs, M W F 10:10 (12 lecs) Sept. 4–Sept. 30. M. Zaitlin, E. D. Earle.
Applications of molecular biology and tissue culture to plant biotechnology are studied. Topics covered include gene introduction and tissue culture technologies, as well as use of cultured plant materials and transgenic plants to obtain resistance to insects, plant diseases, and herbicides and to improve nutritional and food processing qualities. Regulatory and social issues relating to plant biotechnology are discussed.

PL BR 653.3 Plant Genome Organization
Fall. 1 credit. Prerequisite: BIO S 653.1.
Lecs, M W F 10:10–11 (12 lecs), Oct. 7–Nov. 4. S. D. Tanksley.
Module 3 in Plant Molecular Biology series. Molecular structure and evolution of plant nuclear genomes are explored. Topics covered include mechanisms for packaging DNA into chromosomes, molecular structure of telomeres and centromeres, DNA replication and methylation, and molecular biology of plant transposons. Methods for genetic and physical mapping of plant genomes is discussed as well as applications of mapping tools for gene isolation and plant breeding.

[PL BR 716 Perspectives in Plant Breeding Strategies
Spring. 3 credits. S-U grades optional. Prerequisite: PL BR 603. Offered alternate years. Not offered 1992–93.
T 1:25–2:15, R 12:20–2:15. M. E. Sorrells.
Emphasis is on discussion and evaluation of selected benchmark papers and current literature. Selection techniques and breeding objectives, methods, and strategies for both self- and cross-pollinated crops are reviewed and discussed. Extensive outside reading is required.]

PL BR 717 Quantitative Genetics in Plant Breeding
Spring, even years. 3 credits. Prerequisites: PL BR 603 and STATS 601. S-U grades only. Offered alternate years.
T R 8:30–9:55. D. R. Viands, R. L. Plaisted.
Discussion of quantitative genetics to help make decisions for more efficient plant breeding. Specific topics include components of variance (estimated from mating designs), gene pool development, linkage, heritability, phenotypic and genotypic correlation coefficients, and theoretical gain from selection. During one period, plants in the greenhouse will be evaluated to provide data for computing quantitative genetic parameters.

PL BR 718 Breeding for Pest Resistance
Spring. 3 credits. Prerequisites: BIO S 281 or PL BR 225, and PL BR 603 required. An introductory course in Plant Pathology and/or Entomology also highly recommended. Offered alternate years.
Lec, T R 10:10–11:30. M. A. Mutschler.
A multidisciplinary examination of the challenge of incorporating disease and insect resistance into crop plants. Topics covered include national and international germplasm collections, identification of sources of resistance, resistance mechanisms in plants, monogenic and polygenic control of resistance, approaches to breeding for resistance stability of genetic resistance mechanisms, and the use of biochemical/physiological/molecular tools in breeding for pest resistance.

PLANT PATHOLOGY

W. E. Fry, chair; J. R. Aist, P. A. Arneson, S. V. Beer, G. C. Bergstrom, B. B. Brodie, A. R. Collmer, S. M. Gray, R. K. Horst, G. W. Hudler, H. W. Israel, R. P. Korf, J. W. Lorbeer, R. Loria, M. T. McGrath, M. G. Milgroom, E. B. Nelson, P. F. Palukaitis, W. A. Sinclair, S. A. Slack, H. D. Thurston, O. C. Yoder, M. Zaitlin, T. A. Zitter

PL PA 201 Magical Mushrooms, Mischievous Molds
Spring. 2 credits. S-U optional.
Lecs, T R 11:15. G. W. Hudler.
A presentation of the fungi and their roles in nature and in shaping past and present civilizations. The historical and practical significance of fungi as decayers of organic matter, as pathogens of plants and animals, as food, and as sources of mind-altering chemicals will be emphasized.

PL PA 301 Introductory Plant Pathology
Fall. 4 credits. Prerequisites: BIO S 101–102 and 103–104, or 105–106 or 109–110, and BIO S 241 or equivalent.
Lecs, T R 11:15; lab, M T W 1:25–4:25 and one period weekly, scheduled at the convenience of the student. Staff.
An introduction to the theory and practice of plant pathology with emphasis in lectures on principles that govern interactions of plants and pathogens and in laboratories on diagnostic criteria, life cycles of pathogens, and epidemiological phenomena and control. Specific aspects considered in detail include fungi, bacteria, nematodes, viruses, and mycoplasmas as plant pathogens; attack and resistance mechanisms; environmental influences; disease forecasting and loss assessment; development of resistant plants; and chemical and biological control.

PL PA 309 Introductory Mycology
Fall. 3 credits. Prerequisite: a year of biology or equivalent. Concurrent registration in PL PA 319 is recommended.

Lecs, T R 9:05–9:55; labs, R 1:25–4:25.
R. P. Korf.
An introduction to fungi, emphasizing biology, comparative morphology, and taxonomy.

PL PA 319 Field Mycology
Fall. 1 credit. Prerequisite: permission of instructor.
Lab, W 1:25–4:25 and 7:30–9:30 p.m.
R. P. Korf.
Study of mushrooms and other fungi on 7 field excursions followed by 7 evening labs devoted to identification and study of collections under the microscope. Emphasis on ecology, biology, and means of identification. There are no lectures; grades will be determined on basis of laboratory final.

PL PA 402 Plant Disease Control
Spring. 3 credits. Prerequisite: PL PA 301 or equivalent.
Lecs, T R 11:15; lab and rec, T W 1:25–4:25. P. A. Arneson.
This course complements Plant Pathology 301 with an in-depth presentation of the principles and practices of plant disease control that builds on students' knowledge of diseases and their causal agents. General principles and concepts, illustrated by specific examples, are presented. Students write a term paper applying those principles to a specific disease-control problem. The laboratories provide practical experience in diagnosis and disease-control techniques.

[PL PA 411 Plant Disease Diagnosis
Fall. 3 credits. For senior undergraduates specializing in plant pathology or pest management and for graduate students with a major or minor in plant pathology or plant protection. Limited to 20 students. Prerequisites: PL PA 301 or equivalent and permission of instructor. Not offered 1992–93.
Lec, M 11:15; lab, M W 1:25–4:25.
G. W. Hudler.
A method for diagnosis of plant disease is presented with emphasis on contemporary laboratory techniques and effective use of the literature.]

PL PA 443 Pathology of Trees and Shrubs
Fall. 3 credits. Prerequisites: PL PA 301 or equivalents.
Lecs, M W 11:15; labs, F 1:25–4:25.
Evening prelims. G. W. Hudler.
For students preparing for careers in horticulture, urban forestry, and pest management. Deals with the nature, diagnosis, assessment, and treatment of diseases of trees and shrubs. Forest, shade, and ornamental plants are considered.

PL PA 444 Integrated Pest Management (also Entomology 444)
Fall. 4 credits. Prerequisites: BIO S 261, ENTOM 212 or 241, and PL PA 301 or their equivalents or permission of instructor.
Lecs, M W F 9:05; lab, M 1:25–4:25.
P. A. Arneson.
Lectures integrate the principles of pest control, ecology, and economics in the management of pest crop systems. Laboratories consist of exercises to reinforce concepts presented in lecture and demonstrate pest monitoring techniques and the application of computer technology to management problems.

PL PA 497 Special Topics
Fall or spring. 1–5 credits. Students must register with an Independent Study form (available in 140 Roberts Hall). S-U grades optional.
Hours to be arranged. Staff.
An opportunity for independent study of a special topic in mycology or plant pathology under the direction of a faculty member.

PL PA 498 Teaching Experience
Fall or spring. 1–5 credits. Students must register with an Independent Study form (available in 140 Roberts Hall). S-U grades optional.
Hours to be arranged. Staff.
Undergraduate teaching assistance in a mycology or plant pathology course by mutual agreement with the instructor.

PL PA 499 Undergraduate Research
Fall or spring. 3–5 credits. Students must register with an Independent Study form (available in 140 Roberts Hall). S-U grades optional.
Hours to be arranged. Staff.
An opportunity for research experience under the direction of a faculty member.

PL PA 642–661 Special Topics Series
Unless otherwise indicated, the following description applies to courses 642–661. Fall or spring. 1 credit. Prerequisite: permission of instructor. S-U grades only.
Hours to be arranged.
Weekly discussions of current topics in special areas of plant pathology and mycology. Students are required to do extensive reading of current literature and to present oral and written reports.

PL PA 642 Plant Disease Epidemiology
Fall.
T 12:20. M. G. Milgroom.

PL PA 644 Ecology of Soil-Borne Pathogens
Fall and spring. Meets with PL PA 646.
E. B. Nelson.

PL PA 645 Plant Virology
Fall.
F 12:20. S. M. Gray.

PL PA 646 Plant Nematology
Fall and spring. Meets with PL PA 644.
B. B. Brodie.

[PL PA 647 Bacterial Plant Diseases
Fall. Not offered 1992–93.
W 12:20. S. V. Beer.]

PL PA 648 Molecular Plant Pathology
Fall.
R 12:20. A. R. Collmer and O. C. Yoder.

PL PA 649 Mycology Conferences
Spring. 1 credit.

PL PA 650 Diseases of Vegetable Crops
Fall.
W, hours to be arranged. J. W. Lorbeer, T. A. Zitter.

PL PA 652 Field Crop Pathology
Spring.
W 8. G. C. Bergstrom.

PL PA 653 Dendropathology
Spring.
To be arranged. G. W. Hudler, W. A. Sinclair.

PL PA 654 Diseases of Florist Crops
Spring.
F 12:20. R. K. Horst.

PL PA 655 Plant Diseases in Tropical Agriculture
Spring
T 12:20. H. D. Thurston.

PL PA 661 Diagnostic Lab Experience
Summer and fall. 2 credits. S-U grades only.
Hours to be arranged. T. A. Zitter.
For graduate students and advanced undergraduates with a special interest in diagnosing plant diseases. Students will work in the Diagnostic Laboratory (Plant Pathology Department) under supervision of the diagnostician. Students may choose to work on a wide array of plant material or to concentrate on a particular commodity. Priority will be given to graduate students in plant pathology and plant protection.

PL PA 662 Molecular Plant-Pathogen Interactions (also Biological Sciences 652.1)
Spring. 1 credit. Prerequisites: BIO S 281, 330 or 331, and 653.1.
Lecs, M W F 10:10 (12 lecs) Jan. 22–Feb. 17. P. F. Palukaitis, O. C. Yoder.
An examination of the molecular properties that control the development of host-parasitic interactions in both microorganisms (viruses, bacteria, and fungi) and higher plants. Contemporary theories describing the genetic mechanisms of pathogenesis and resistance are discussed.

PL PA 663 Plant Biotechnology (also Biological Sciences 653.2 and Plant Breeding 653.2)
Fall. 1 credit. Prerequisites: BIO S 281, 330 or 331, and 653.1.
Lecs, M W F 10:10 (12 lecs) Sept. 4–Sept. 30. M. Zaitlin, E. D. Earle.
Applications of molecular biology and tissue culture to plant biotechnology are studied. Topics covered include gene introduction and tissue culture technologies, use of somaclonal variation, use of cultured plant materials and transgenic plants to obtain resistance to insects, plant diseases, and herbicides and improve nutritional and food processing qualities. Regulatory and social issues related to plant biotechnology are discussed.

PL PA 681 Plant Pathology Seminar
Fall and spring. 1 credit. Required of all plant pathology majors. S-U grades only.
T 4:30–5:30. Staff.

PL PA 701 Concepts of Plant Pathology: Organismal Aspects
Spring. 3 credits. For graduate students with majors or minors in plant pathology; others by permission. Prerequisites: PL PA 301 or equivalent and permission of instructor.
Lecs, T R 9:05; lab-disc, R 2–4:25.
A. R. Collmer.
Concepts in host-pathogen relationships with emphasis on roles of molecules and cells in determining the outcome of an interaction. Genetic, molecular biological, physiological, and cell biological approaches to experimental analysis of exemplary host-pathogen systems will be considered. Historical perspectives and recent research will be reviewed and analyzed. Students prepare and review mock grant proposals.

PL PA 702 Concepts of Plant Pathology: Population Aspects
Spring. 3 credits. For graduate students with a major or minor in plant pathology; others by permission. Prerequisite: PL PA 301 and permission of instructor.
Lec, T R 8; lab, T 2–4:25. M. G. Milgroom.

Theory and concepts in epidemiology and population biology of plant diseases. Topics include: population dynamics of pathogens in time and space, interactions of pathogen and plant populations, disease in natural communities, and applications of theory and modeling to disease management. The laboratory period will be for discussions and exercises that illustrate concepts introduced in lectures.

PL PA 705 Phytovirology
Spring. 2 credits. For graduate students with a major or minor in plant pathology; others by permission. Prerequisite: PL PA 301 or equivalent. Offered alternate years.
Lec, T R 10:10. M. Zaitlin.
This course considers plant viruses and the diseases they cause. Consideration is given to virus structure and composition, classification, replication, effects on hosts, modes of transmission, and the relationships of these aspects to principles of diagnosis and control.

[PL PA 706 Phytonematology
Fall. 2 credits. For graduate students with a major or minor in plant pathology; others by permission. Prerequisite: PL PA 301 or equivalent or permission of instructor. Not offered 1992–93.
Lec, R 11:15; lab, R 1:25–4:25. Staff.
Deals with morphology, anatomy, biology, physiology, ecology, detection and identification of plant pathogenic nematodes, evaluation of population data, interactions between nematodes and other plant pathogens, and methods of assessment of pathogenicity and plant damage.]

PL PA 707 Phytobacteriology
Fall. 2 credits. Prerequisites: general microbiology, lectures and laboratory; Introductory Plant Pathology. Offered alternate years.
Lec, W 9:05; lab, W 1:25–4:25. S. V. Beer.
A consideration of the prokaryotes that cause disease in plants and examples of the diseases they cause. The course emphasizes properties of bacterial pathogens that affect disease, methods for manipulation of the pathogens, and recent developments in phytobacteriology. The current state of knowledge of important phytopathogenic genera including their genetics and mechanisms of pathogenesis will be reviewed. Laboratory practice in isolation, inoculation, identification, genetics, and physiology is included.

PL PA 709 Phytomycology
Spring. 2 credits. For graduate students with a major or minor in mycology or plant pathology; others by permission. Prerequisites: PL PA 301 and 309 or equivalents, and permission of instructor.
Lec, F 1:25–2:30; lab, 2:30–4:30.
J. W. Lorbeer.
Provides basic information on the biology of plant pathogenic fungi with selected emphasis on the structure, ecology, genetics, life cycles, and disease cycles of representative genera and species.

PL PA 715 Phytovirology Laboratory
Spring. 2 credits. Limited to 12 students. Prerequisite: permission of instructor. S-U grades only. Offered alternate years.
Two 3-hour lab sessions, hours to be arranged. P. Palukaitis.

[PL PA 735 Advanced Plant Virology
Spring. 3 credits. Prerequisite: permission of instructors. Not offered 1992–93.
3 lecs, hours to be arranged. P. Palukaitis, M. Zaitlin.
Topics in plant virology, with an emphasis placed on student discussion of current literature. Topics included are viral infection process, viral and viroid replication, viral recombination, viral movement, viral genes and their products, cross protection, detection of viruses, molecular approaches to resistance and the use of viruses as vectors for introducing genetic material into plants.]

[PL PA 738 Filamentous Fungi: Genetics and Mechanisms of Pathogenesis
Fall. 2 credits. Prerequisite: BIO S 281 or equivalent. Not offered 1992–93.
Hours to be arranged. O. C. Yoder and B. G. Turgeon.
Classical and molecular approaches to the study of fungal genetics are discussed. Recently developed molecular technology is highlighted, with emphasis on transformation systems, gene disruption and replacement, gene over-expression, stability of transforming DNA, native transposons and plasmids, karyotyping by chromosome separation, and secretion of heterologous proteins. Application of contemporary methodology to genetic dissection of developmental processes, such as plant pathogenesis (including host and tissue specificity), the mitotic and meiotic cell cycles, and conidium formation is described. Experimental evidence supporting various hypotheses to explain fungal pathogenicity is evaluated. Examples are chosen from investigations of recently developed plant pathogenic fungi such as *Cochliobolus heterostrophus* and *Magnaporthe grisea* and from well known genetic models such as *Aspergillus nidulans* and *Neurospora crassa*.]

PL PA 739 Advanced Mycology
Fall. 4 credits. Prerequisites: PL PA 309 or equivalent, a course in genetics, and permission of instructor. Offered alternate years.
Lec, M 10:10; labs, M W 1:25–4:25, and an additional 3-hr. period to be arranged. R. P. Korf.
A detailed study of the taxonomy, nomenclature, and biology of four major groups of fungi (rusts smuts, peronosporales, and fungi imperfecti).

[PL PA 756 Advanced Plant Nematology
Spring. 3 credits. For graduate students with a major in plant pathology and special interest in nematology. Prerequisite: permission of instructor. Offered alternate years. Not offered 1992–93.
Hours to be arranged. Staff.]

PL PA 788 Research in Molecular Plant Pathology
Fall and spring. 2, 4, or 6 credits. Prerequisite: permission of instructor. S-U grades only.
Lab, hours to be arranged. S. V. Beer and staff.
Guided research experiences in laboratories addressing questions concerning the interaction of pathogens (bacteria, fungi, viruses) and plants at the molecular level. Intended for beginning graduate students with a concentration in Molecular Plant Pathology and sufficient theoretical background and practical laboratory experience. Students submit plans and reports on each research experience.

PL PA 797 Special Topics
Fall or spring. 1–5 credits. S-U grades optional.
Hours to be arranged. Staff.
An opportunity for independent study of a special topic.

PL PA 799 Graduate Research
Fall or spring. 1–5 credits. S-U grades optional.
Hours to be arranged. Staff.

POMOLOGY (FRUIT SCIENCE)

See Horticultural Sciences.

RURAL SOCIOLOGY

D. L. Brown, chair; P. R. Eberts, E. C. Erickson, S. Feldman, J. D. Francis, C. G. Geisler, N. T. Glasgow, D. T. Gurak, M. M. Kritz, T. A. Hirschl, T. A. Lyson, P. D. McMichael, J. M. Stycos, R. W. Venables, F. W. Young

R SOC 100 American Indian Studies: An Introduction
Fall. 3 credits. S-U grades optional.
Lec, W 7–10 p.m. R. W. Venables.
This course provides a foundation for the study of American Indians. Emphasis will be placed on social, cultural, historical, educational, and human development. Guest lecturers from Cornell's staff and the Indian community will serve to broaden the scope of the course.

R SOC 101 Introduction to Sociology
Fall or spring. 3 credits. (See SOC 101 as an alternative.) May not be taken after R SOC 102.
Fall: Lecs, T R 10:10; disc and lab, M 9:05, 10:10, 12:20; R 11:15, 12:20; F 10:10, 12:20. D. L. Brown and staff.
Spring: Lecs, T R 10:10; disc: M or F 9:05, 10:10, 11:15, 12:20, 1:25, or 2:30. E. C. Erickson and staff.
A survey of major concepts and theories in sociology and an examination of major social forces and institutions shaping modern societies. The major topics include culture and socialization, social stratification and social class, age and gender inequality, economy and society, politics and the state, urbanization and demographic change, social change and international development, the rural-urban transition, and war and peace.

[R SOC 102 Introduction to Rural Sociology
Spring. 3 credits. May not be taken after R SOC 101. S-U grades optional. Not offered 1992–93.
Lecs, T R 10:10; disc, M or F 9:05, 10:10, 11:15, 12:20, 1:25, or 2:30. T. A. Lyson.]

[R SOC 104 Proseminar: Issues and Problems in Rural Society
Fall. 1 credit. S-U grades only. Not offered 1992–93.
R 12:20–1:25. Staff.]

R SOC 175 Issues in Contemporary American Indian Societies
Spring. 3 credits. S-U grades optional.
W 7 p.m. R. W. Venables.
American Indian people are confronted with a myriad of special circumstances that impinge upon their everyday lives. The purpose of this course is to present background to these issues and give perspective from an American Indian point of view. Early history and the

postcontact period will be reviewed with an emphasis given to developments since 1890. Topics such as land claims, treaties, education, mineral and water rights, social problems, militant organizations, and civil rights will be covered, with guest lecturers and media presentations giving added impact.

R SOC 200 Social Problems
Fall. 3 credits. S-U grades optional.
Lecs, M W F 9:05. T. A. Hirschl.
This course investigates a variety of current social problems from a sociological perspective. The course begins with an overview of sociological theories that may account for social problems and identifies common as well as competing elements of these theories. Theoretical framework is then applied to analyses of a variety of social problems, and these may vary semester to semester. Examples of social problems are homelessness, teenage pregnancy, deindustrialization, and homicide, among others. Emphasis in the course will be given to how social problems are measured, and students will be given an opportunity to test theories with data analysis.

R SOC 201 Population Dynamics (also Sociology 205)
Spring. 3 credits. S-U grades optional. ALS students must register for this course as R SOC 201.
T R 2:30–3:45. J. M. Stycos.
An introduction to population studies, which include the determinants and consequences of population change. The primary focus is on the influences of demographic dynamics on society and the economy, with emphasis on marriage, family formation, mortality, crime and deviance, migration, and marketing behavior.

R SOC 205 International Development
Spring. 3 credits.
M W F 10:10. P. D. McMichael.
The controversy surrounding development models in the post-Cold War era is examined from a comparative and global perspective on North-South relations. While the focus is the "Third World," the issues confronting it are often global, even when they concern the most basic issue of food security. Using films and various theoretical perspectives, we examine Southern societies (economies, ecologies, class/gender relations) and the impact of global forces on Southern resources. Such forces include new social diets, new forms of export agriculture, development agencies, local bureaucracies, agribusiness corporations, the current debt crisis, and technologies such as the Green Revolution.

R SOC 206 Gender and Society
Spring. 3 credits.
M W F 11:15. N. L. Glasgow.
Course will familiarize students with social and behavioral similarities/differences between females and males, and degree that biological, psychoanalytic, social psychological, and sociological perspectives help understand the differences. Objectives will be met through lectures, readings, films, participant observations, and personal experiences. Cross-cultural comparisons of gender role behavior will be made.

R SOC 208 Technology and Society
Fall. 3 credits.
M W F 10:10. C. C. Geisler.
The relationship between technology and society is among the most pervasive concerns of our time. Ultimately, what makes a technology useful or "appropriate" is a sociological question. Lectures and readings review classical debates regarding technology and society. Herein, students compare high technologies and appropriate technologies, identify problems associated with technology transfer to other societies, and create a list of important criteria by which technologies are judged appropriate or inappropriate using numerous case studies.

R SOC 213 Social Indicators, Data Management, and Analysis
Fall. 3 credits.
Lecs, T R 2:30–3:45. P. R. Eberts.
A survey of definitions of social indicators and general principles of social indicators research will be illustrated from data on both developed and less-developed countries. Data management and analysis of measures of poverty, level of living, inequality, quality of life, etc., based on census data, household surveys, and key-informant and other low-cost techniques, will be examined, using personal computers.

[R SOC 242 American Indian Philosophies I: Power and World Views
Fall. 3 credits. Enrollment limited to 20 students. Not offered 1992–93.
T R 10:10–11:25. Staff.
This course is designed to facilitate an understanding of the world views of American Indians of the past and present. The goal is to provoke edifying discourse that will enable American Indian beliefs concerning the workings of the universe and the relationship of human beings to nature to be understood on their own terms.]

[R SOC 243 American Indian Philosophies II: Native Voices
Spring. 3 credits. Enrollment limited to 20 students. Not offered 1992–93.
T R 10:10–11:25. Staff.
An exploration of the diverse expressions of philosophy to be found in the words of American Indians. Novels, political treatises, speeches, autobiographies, and other sources reflecting Indian attitudes on a variety of subjects will be examined for beauty and power of expression as well as to identify recurring themes.]

[R SOC 250 Farming as an Occupation
Spring. 1 credit. Not offered 1992–93.
R 12:20–1:25. E. C. Erickson.]

R SOC 301 Theories of Society (also Sociology 401)
Fall. 4 credits. Prerequisites: rural sociology or sociology course. S-U grades optional.
T R 3:35–5:20. F. W. Young.
A seminar for juniors, seniors, and beginning graduate students, especially in rural sociology and sociology. A survey of major theoretical approaches to the study of society and social institutions, with emphasis on (1) the central concepts of the sociological tradition, (2) major classical theorists (Marx, Durkheim, Weber) and contemporary counterparts, and (3) application of the classical ideas in contemporary research. Applications of theories of society to current research and social problems will be stressed.

R SOC 318 Ethnohistory of the Northern Iroquois
Fall. 3 or 4 credits. S-U grades optional.
Lec, T 1:25–4:30. R. W. Venables.
The development of Iroquois (Houdenosaunee) culture is traced from the Archaic period to the present day. Changes in cultural ecology, social organization, and world view are examined. Supplemental information is drawn from accounts of neighboring groups in southern Canada and western New England. Approximately one-third of the course is devoted to contemporary issues faced by the Iroquois people.

R SOC 324 Environment and Society
Fall. 3 credits.
M W F 1:25. Staff.
Explores various sociological approaches to the study of society and its physical environment and analyzes major contemporary environmental issues from a sociological viewpoint. Among the major topics treated are world population growth, energy and environmental policy, the world food crisis, the limits to growth debate, the impacts of technological and social change in agriculture on environmental quality, global warming, sustainable development, genetic resources conservation, and tropical deforestation.

[R SOC 367 American Indian Tribal Governments
Fall. 3 credits. Not offered 1992–93.
W 7:30–9:55 p.m. Staff.
This course focuses on the structure of contemporary tribal governments and the ways in which those governments approach the issues confronting their constituents. The effects of European contact on traditional political organizations are detailed, as are the present-day relationships of tribal governments to federal and state governments.]

R SOC 370 Comparative Issues in Social Stratification
Fall. 3 credits. Prerequisite: an introductory social science course.
T R 12:20–1:35. T. A. Lyson.
This course reviews both classicial and contemporary issues in the social stratification literature. Particular attention is given to two main themes: the changing configuration of the labor market and the contemporary debates on the "under class," the "middle class," and the "new class." Throughout the course attention is drawn to the importance of conceptual clarity, questions of measurement, and the changing salience of popular topics such as new social movements, the role of ideology and consciousness, and the role of gender, race, and ethnicity in assessments of inequality and hierarchy.

R SOC 380 Independent Honors Research in Social Science
Fall and spring. 1–6 credits. Limited to students who have met the requirements for the honors program. A maximum of 6 credits may be earned in the honors program.
Staff.
Students must submit written proposals by the third week of the semester of their senior year to the departmental honors committee representative, T. Hirschl.

[R SOC 408 Human Fertility in Developing Nations
Fall. 3 credits. S-U grades optional. Offered alternate years. Not offered 1992–93.
W 7:30–10 p.m. J. M. Stycos.
A review of the major literature dealing with the social causation of variation in human fertility. Emphasis will be on international comparisons and on the methodology of field research.]

R SOC 418 Population Policy
Spring. 3 credits. Prerequisite: R SOC 201 or permission of instructor.
T R 10:10–11:25. J. M. Stycos.
The ways in which societies try to affect demographic trends. Special focus is on government policies and programs to reduce fertility.

R SOC 425 Gender Relations, Gender Ideologies, and Social Change
Fall. 3 credits.
R 1:55–4:25. S. Feldman.
This course offers comparative analyses of rural women's work in agriculture, domestic and household production, and forms of wage work and self-employment in both Third World and advanced industrial countries. Drawing on feminist and sociological theory and methods, the course examines gender ideologies, work-family linkages, responses to technological innovation, the transformation of the labor process, and the international division of labor as processes which restructure gender relations and challenge existing proscriptions or prescriptions of women's behavior.

[R SOC 430 Migration and Population Distribution
Fall. 3 credits. Offered alternate years. Not offered 1992–93.
T R 8–9:55. D. L. Brown.
This course analyzes the determinants and consequences of internal migration in urban and rural areas of developed nations with particular emphasis on the United States. Economic and demographic inter-relationships are emphasized as are implications of changes in local and regional population size and composition for labor supply, the demand for goods and services, and infrastructure. Public policy implications of the inter-relationships will be investigated. Techniques and measurement issues associated with the analysis of migration and urbanization are discussed.]

R SOC 431 Social Demography of Minorities
Spring. 3 credits. S-U option. Offered alternate years.
T R 12:20–1:35. D. T. Gurak.
Ethnic conflict and accomodation is examined in diverse settings (societies and historical periods). Demographic indicators (such as residential segregation, marital patterns, mortality and fertility differentials, and occupational mobility) of underlying social conditions serve as the principal vehicle for evaluating the status of ethnic relations.

[R SOC 436 Small Towns in Metropolitan Society: Changing Structures and Quality of Life
Spring. 2 or 3 credits. S-U grades optional. Prerequisite: a social science course. Not offered 1992–93.
T 3:35–5:20. P. R. Eberts.]

R SOC 437 Aging: Issues and Social Policy in the 1990s
Fall. 3 credits. Prerequisite: R SOC 101 or its equivalent.
T R 10:50–12:05. N. L. Glasgow.
An analysis of the "graying" of America and the responses of the public and private sectors to the demographic revolution. Examines the interplay between basic and applied knowledge in social gerontology. Explores the formal and informal networks of services, in both rural and urban environments, that help maintain independent living arrangements by the elderly.

R SOC 438 Social Demography
Fall. 3 credits.
T R 10:50–12:05. D. T. Gurak.
This course surveys the methods, theories, and problems of population studies. Attention is directed to the social, economic, and cultural determinants and consequences of population growth, distribution, and change. The core areas of demography, fertility, mortality, and migration are studied. Comparisons are made between developed and developing areas and between Africa, Asia, and Latin America.

[R SOC 439 Social and Demographic Changes in Asia
Spring. 3 credits. Prerequisite: R SOC 201. Offered alternate years. Not offered 1992–93.
W 7:30 p.m. Staff.]

R SOC 440 The Social Impact of Resource Development
Spring. 3 credits. S-U grades optional. Offered alternate years.
W 7:30–10 p.m. C. G. Geisler.
The seminar defines social-impact assessment (SIA), places it in the context of contemporary theories of development, and identifies alternative SIA models. Focus is on the SIA experiences of various groups and constituencies, including indigenous people at home and abroad. Students will learn certain practical research skills needed in doing SIA and will participate in an SIA simulation exercise.

R SOC 442 American Indian Philosophies: Selected Topics
Spring. 3 credits. S-U grades optional. Prerequisite: R SOC 242 or 243, or R SOC 100 or 175, or permission of instructor.
Lec. T 1:25–4:25. R. W. Venables.
The course provides an opportunity for students to explore in depth a wide range of American Indian Philosophies I and II or other introductory American Indian studies courses in greater depth.

R SOC 475 Global Patterns of International Migration
Fall. 3 credits. Prerequisite: R SOC 101.
M W F 9:05–9:55. M. M. Kritz.
A comparative approach will be taken in looking at international migration patterns in different countries and regions, assessing how migration flows are changing in an increasingly interdependent world. Various types of international migration (e.g. permanent, refugee, labor, illegal, brain drain, etc.) will be looked at from the perspective of both the receiving and sending countries and their policy, economic, and social correlates reviewed.

[R SOC 490 Society and Survival
Fall. 3 credits. Prerequisite: introductory sociology course or permission of instructor. Not offered 1992–93.
T R 2:30–3:45. D. T. Gurak.
Course surveys existing theories, methodological techniques, and research results relating to how social, economic, and cultural structures and processes affect survival chances in diverse societies. A comparative framework is presented and the utility of existing knowledge for policy-related applications in different societies is assessed. Attention is given to the problems associated with imputing causality in morbidity and mortality data.]

R SOC 492 Contemporary Issues Seminars: Developments in the Pacific Rim
Spring. 1–2 credits.
M 1:25–2:15. P. D. McMichael.
Pacific Rim dynamics challenge U.S. supremacy, Western conceptions of modernization, and "Third World" unity. We relate these trends to regional political, economic, and cultural forces, including the Japanese model, the "Newly Industrializing Countries" (e.g., South Korea, Taiwan), the "third tier" countries (e.g., Indonesia, the Philippines), and emerging Chinese markets.

R SOC 495 Population, Environment, and Development in Sub-Saharan Africa
Fall. 3 credits.
M 7:30–10 p. m. M. M. Kritz.
The 47 countries of sub-Saharan Africa are experiencing rapid social change but serious economic, environmental, and social problems. This course will examine these trends by looking at their interrelations to demographic change. Both the traditional structures and the modernizing forces shaping sub-Saharan African development will be examined, and variations stemming from ethnic and colonial influences assessed. Family, and gender systems, education, urbanization, and demographic processes will be reviewed, as well as the role of state policy in affecting population, ecological and development change.

R SOC 497 Informal Study
Fall or spring. 3 credits (may be repeated for credit). Students must register with an Independent Study form (available at 140 Roberts Hall). S-U grades optional.
Staff.
Informal study may include a reading course, research experience, or public service experience.

R SOC 603 Classical Sociological Theory
Spring. 4 credits. S-U grades optional. Prerequisites: open to graduate students and undergraduates with permission of instructor.
T R 3:35–5:15. Staff.
An overview of the main streams of classical sociological thought, focusing on the work of Marx, Durkheim, and Weber. Emphasis is placed on the concepts, method, and ontological posture of the three major classical sociological theorists, on rival interpretations of their theoretical systems within the contemporary sociological community, and on the implications of classical thought for contemporary development theories.

[R SOC 604 Theories of Social Change
Spring. 3 credits. S-U grades optional. Not offered 1992–93.
T R 3:35–4:50. P. D. McMichael and S. Feldman.]

R SOC 606 Contemporary Sociological Theories of Development
Fall. 3 credits.
M W F 11:15. F. W. Young.
A survey of theory, empirical studies, and policy prescriptions as applied to communities and regions, especially those in less-developed countries. Social ecology, the Weberian tradition, dependency/political economy, and structural theory are compared.

[R SOC 610 Population and Development: Developed Nations
Fall. 3 credits. Open to graduate students, and undergraduates with permission of instructor. Not offered 1992–93.

W 1:25–4:25. D. L. Brown.
Investigates interrelationships between demographic, social, and economic changes in developed nations past, present, and future. Particular focus is on relationships between demographic processes (fertility, mortality, internal migration, and immigration) and such issues as national and regional economic growth; labor force and labor market structure and change; income distribution and poverty; design, administration, and finance of social welfare policy; national resource use and availability.]

R SOC 618 Research Design
Fall. 4 credits. Prerequisite: a statistics course.
T R 12:20–2:20. J. D. Francis.
First of a two-semester sequence (may be taken individually) in introductory graduate methods. Discusses problems of measurement, the design of instruments, and problems of reliability and validity. Common forms of measuring instruments are discussed. Concludes with an introduction to factor analysis. Students apply principles to development of several common types of scales. Computers will be used extensively.

R SOC 619 Research Design II
Spring. 4 credits. Prerequisite: an introductory methods course and a statistics course. Offered alternate years.
T R 1:25–3:30. J. D. Francis.
The second part of the two-semester sequence in introductory graduate methods deals with principles of design, especially nonexperimental designs, with emphasis on an intermediate-level treatment of the following topics: regression, analysis of variance, analysis of covariance, and causal models. Special emphasis is given to use of categorical variables in regression. Students develop and examine several analytical models using actual data to familiarize themselves with data handling and processing. Extensive use of computers.

[R SOC 625 State, Economy, and Society
Fall. 3 credits. Offered alternate years. Not offered 1992–93.
W 1:25–3:55. P. D. McMichael.
Reviews major issues concerning the relations between political and economic institutions and the role of political and economic relations in the process of social change. Theoretical perspectives are drawn from classical and modern social theory, including the application of comparative and historical methodologies. Substantive themes concern debates about the trajectories and crises of capitalism and socialism and the modern world economy.]

[R SOC 640 Community and Changing Property Institutions
Fall. 3 credits. Not offered 1992–93.
T R 2:30–3:45. C. C. Geisler.
The seminar acquaints students with the evolution of property rights, beginning in antiquity, and with the close association between changing property forms and community types as recognized by both classical and contemporary sociologists. Readings will cover land-use regulation and property rights, common property issues and the land ethic.]

[R SOC 641 Politics and Economics of Rural and Regional Development
Fall. 3 credits. Limited to upperclass or graduate students. S-U grades optional. Offered alternate years. Not offered 1992–93.
M 12:20–2:50. T. A. Lyson.
A survey of social, political, and economic factors in regional development. Theories of regional development and underdevelopment are explored. The neoclassical paradigm is offered as a benchmark against which other more "structural" alternatives can be compared. The politics of rural and regional development are explored through two sets of readings dealing with industrial policy.]

[R SOC 642 Regional Systems and Policy Analysis
Spring. 3 credits. Prerequisites: a social or economic theory course and statistics, or permission of instructor. S-U grades optional. Not offered 1992–93.
F 2:20–4:30; disc to be arranged.
P. R. Eberts.]

[R SOC 643 Land Reform Old and New
Spring. 3 credits. Offered alternate years. Not offered 1992–93.
R 2:30–5. C. C. Geisler.
Land reform continues to be a major cornerstone of development planning. Between 1980 and 2000 the number of landless and near-landless in the Third World will approach one billion. Though land reform is a principal source of hope for the landless, its meanings are many and its models are controversial. The seminar acquaints students with land reform in antiquity as well as in contemporary settings (e.g., Japan, the Philippines, Israel, India, Brazil, Mexico, the Soviet Union, and the United States). Perennial issues of equity, efficiency, and sustainability will be discussed in each of these case study areas.]

R SOC 645 Rural Economy and Society
Fall. 3 credits. Offered alternate years.
W 7:30–10 p.m. S. Feldman.
The structure and dynamics of rural economy and society are treated in a comparative framework, focusing on continuities and divergences in rural, social, and economic change in advanced and peripheral societies. Major topics will include classical theories of rural economy and society, the application of these classical theories in the peasant studies and agrarian political economy literatures, technology and rural social change, the agrarian and nonagrarian informal sectors, pluriactivity, rural social structure in a spatial framework, rural economic restructuring, and relationships between agrarian and industrial productive relations.

[R SOC 655 Advanced Techniques of Demographic Analysis
Spring. 3 credits. Prerequisites: R SOC 481 or CEH 438, graduate standing or permission of instructor. Offered alternate years. Not offered 1992–93.
W 1:25–3:55. D. T. Gurak.
An examination of analytical techniques that assumes a basic knowledge of demographic data and research methodology. Life tables, demographic estimates with incomplete data, survey techniques to supplement inadequate vital registration systems, and multivariate procedures are among the topics to be covered.]

R SOC 660 Social Analysis of Ecological Change
Spring. 3 credits. Prerequisite: graduate standing.
T 7–10:20 p.m. P. Taylor.
Scientific studies of ecological and social processes together with the analysis of those studies by historians, sociologists, and anthropologists. Topics include cybernetics, systems ecology, the tragedy of the Commons, *Limits to Growth*, ecological degradation, political ecology, global models, conservation biology, and sustainable development.

[R SOC 690 Human Ecological Theory
Spring. 3 credits. Prerequisite: graduate standing or permission of instructor. Offered alternate years. Not offered 1992–93.
M 7:30–10 p.m. Staff.
This course presents and reviews the theoretical perspective and tradition of human ecology in sociology, beginning with Durkheim, through the Chicago school (McKenzie, Park and Burgess), to the neo-orthodox positions of Hawley, Duncan, Schnore, Gibbs, Martin, and others. Applications and differences between the ecological paradigm and Marxian theory are presented. Sociological and demographic research incorporating ecological theory is analyzed and reviewed. Applications of ecological approaches in other disciplines (principally anthropology and geography) is discussed. Application of the ecological orientation to social and economic development is presented.]

R SOC 715 Comparative Research Methods
Fall. 3 credits.
M 12:20–2:50. T. A. Lyson.
This seminar focuses on the comparative method in the social sciences. The logic of comparative inquiry forms the substantive base of the course. Topics include cross-national and cross-regional research design and an analysis of the comparative case study approach. Illustrations of the comparative research approach will cover a range of data types and problems.

[R SOC 718 Multidimensional Measurement and Classification
Fall. 4 credits. Prerequisite: previous course work in scaling and statistics. Not offered 1992–93.
T R 12:20–2:20. J. D. Francis.
An advanced course in measurement and scaling, building from work by Thurstone, Guttman, and Coombs to multidimensional measurements. Topics include philosophy of factor analysis, factor analytic models, factoring design, and comparison with factor analytic models. Cluster analysis, multidimensional scaling, and discriminate analyses are the other major topics discussed. As matrix algebra is an integral part of these procedures, class time is devoted to that topic. Computers are used to analyze fit to models.]

[R SOC 719 Regression and Path Analysis
Spring. 4 credits. Prerequisites: two courses in statistics and one in methods. Offered alternate years. Not offered 1992–93.
T R 12:20–2:20. J. D. Francis.
The first part of the course reviews multiple regression theory and procedures, after which extensions of those models to categorical data are discussed. Consideration is given to violations of assumptions and their effects. Then more-advanced regression concepts and

estimation techniques are discussed. The middle third of the course deals with logit, probit, and log linear models. The last part deals with recursive and nonrecursive path models. Time-series analysis is the last topic discussed. Computerized laboratories are an integral part of the course.]

R SOC 721 Sociology of Environment and Development
Spring. 3 credits.
M 12:20–2:50. Staff.
This course focuses on recent theories relating to societal-environmental relations in the context of social change and development and on the application of these theories. Topics covered will include conceptualization of nature and resources, neo-Malthusianism, theories of extractive economies, co-evolutionary development, environmental mobilization, and political-economic approaches to environmental destruction. Application will focus critically on the notion of "sustainable development."

[R SOC 723 Social Movements in Agrarian Society
Spring. 3 credits. Offered alternate years. Not offered 1992–93.
W 1:25–4. F. W. Young.
The seminar moves from a critical review of current explanatory formats (resource-mobilization, political economy, structuralist) to a research practicum focused on ethnoregional movements, illustrating the possibilities of comparative research based on descriptive accounts. Those movements are associated with agricultural and industrial change, as well as shifts in the regional ethnic/class system.]

[R SOC 725 The Sociology of "Third World" States
Spring. 3 credits. Offered alternate years. Not offered 1992–93.
W 1:25–3:55. S. Feldman.
This course examines how processes of political and economic restructuring have reshaped state capacities and processes of state formation. The course gives particular attention to questions of elite and class formation, corporatist alliances, transnational interests, and the reshaping of development alternatives as these have emerged from changes since the Bretton Wood Agreements. Particular attention is given to restructuring of the international monetary regime in the 1980s. Examining historical examples the course also considers the effects of contemporary economic and political crises on constituent populations including ethnic groups, women, urban workers, and farmers.]

R SOC 730 Sociology of the World Economy
Spring. 3 credits. S-U grades optional. Offered alternate years.
W 1:25–3:55. P. D. McMichael.
Analyses of social change and development are increasingly sensitive to global context, including the sociology of the world-economy as a multi-layered entity, anchored in an evolving division of world labor and interstate system. The analysis of transnational economic and cultural processes (such as food regimes, commodity chains, and international labor complexes), has substantive and methodological dimensions. We critically examine both dimensions, considering a variety of levels and kinds of analysis of global processes. This includes global theories (and their limits), and methods of situating local processes within their world-historical context.

[R SOC 741 Community Development and Local Control
Spring. 3 credits. Offered alternate years. Not offered 1992–93.
W 1:25–3:55. C. C. Geisler.
Theories of community growth and decline and the current debate over the place of local control in community development in general are considered. Salient themes include the role of neopopulism in community development, changing institutions of property as community development occurs, and changing definitions of community.]

R SOC 751 Applications of Sociology to Development Programs
Spring. 3 credits. Offered alternate years.
W F 10:10. E. C. Erickson.
Strategies of change and the measurement of change at national, regional, community, and institutional levels are reviewed. Illustrative topics to be covered are indices of development such as GNP, social welfare, urban hierarchies and evaluation of programs, uses of baseline studies, etc.

[R SOC 754 Sociotechnical Aspects of Irrigation (also Agricultural Economics 754, Agricultural and Biological Engineering 754, and Government 644)
Spring. 2–3 credits. S-U grades optional. Not offered 1992–93.
Hours to be arranged. R. Barker, M. Walter, N. Uphoff.
Examines irrigated agriculture and its relation to agricultural development. Emphasis on social processes within irrigation systems and interactions with the social setting, including political and administrative aspects. Provides an opportunity to examine systematically the institutional and organizational policy issues associated with the design and operation of systems of irrigated agriculture in developing countries.]

R SOC 771 Special Seminar
Fall or spring. Credit to be arranged. Limited to graduate students; others by permission of instructor.

R SOC 791 Teaching Experience
Fall or spring. 1–3 credits. Limited to graduate students. S-U grades only.
Staff.
Participation in the ongoing teaching program of the department.

R SOC 792 Public Service Experience
Fall or spring. Credit to be arranged. Limited to graduate students. S-U grades optional.
Staff.
Participation in the ongoing public service activities of the department.

R SOC 871–874 Informal Study
Fall or spring. Credit to be arranged. Limited to master's and doctoral degree candidates with permission of the graduate field member concerned. S-U grades optional.

R SOC 871 Rural Sociology

R SOC 872 Development Sociology

R SOC 873 Organization Behavior and Social Action

R SOC 874 Methods of Sociological Research

R SOC 881 Research
Fall or spring. Credit to be arranged. Limited to master's and doctoral degree candidates with permission of the graduate field member concerned. S-U grades optional.

SOIL, CROP, AND ATMOSPHERIC SCIENCES

R. J. Wagenet, chair; M. Alexander, P. C. Baveye, D. R. Bouldin, R. B. Bryant, J. H. Cherney, S. J. Colucci, K. H. Cook, W. J. Cox, S. D. DeGloria, J. D. DiTomaso, J. M. Duxbury, G. W. Fick, D. L. Grunes, R. R. Hahn, J. L. Hutson, S. D. Klausner, W. W. Knapp, L. V. Kochian, T. A. LaRue, A. C. Leopold, D. L. Linscott, R. F. Lucey, M. B. McBride, J. Mt. Pleasant, R. L. Obendorf, W. D. Pardee, J. H. Peverly, W. S. Reid, S. J. Riha, T. W. Scott, T. L. Setter, P. L. Steponkus, H. M. van Es, A. Van Wambeke, R. M. Welch, D. S. Wilks, M. W. Wysocki, R. W. Zobel

Courses by Subject

Atmospheric Science: 131, 231, 250, 334, 342, 343, 352, 353, 354, 357, 435, 444, 446, 447, 451, 456, 692, 791, 859, 959

Crop Science: 311, 312, 314, 315, 317, 608, 610, 612, 613, 614, 642, 690, 691, 695, 829, 929

Remote Sensing: 461, 660

Soil Science: 260, 321, 362, 363, 364, 365, 371, 372, 373, 385, 398, 471, 473, 483, 663, 666, 667, 669, 675, 681, 693, 771, 774, 889, 989

General Courses

SCAS 190 Sustainable Agriculture
Fall. 2 credits. Limited to 40 students. S-U grades optional.
Lec, T 9:05–9:55; labs, R 10:10–12:05 or R 2:30–4:25. T. W. Scott, G. W. Fick, D. S. Wilks.
This course is designed to be an enjoyable introduction to basic food production resources (soils, crops, and climates), and it emphasizes management concepts that conserve or renew those resources for continuing benefit to society. Presentations are targeted for non-majors and students new to the field and cover information of general value. Laboratories include several field trips and stress hands-on experience with soils, crops, and descriptive climatology. The laboratory is required.

SCAS 497 Special Topics in Soil, Crop, and Atmospheric Sciences
Fall or spring. 1–6 credits. S-U grades optional. Students must register with an Independent Study form (available in 140 Roberts Hall).
Hours to be arranged. Staff.
The topics in soil science or crop science or atmospheric science are arranged at the beginning of the term for individual study or for group discussions.

SCAS 498 Teaching Experience in Soil Science, Crop Science, and Atmospheric Science
Fall or spring. 1–5 credits. Students must register with an Independent Study form (available in 140 Roberts Hall). S-U grades optional.
Teaching experience in soil science, crop science, or atmospheric science is obtained by

assisting in the instruction of a departmental course.

SCAS 499 Undergraduate Research
Fall or spring. Credit to be arranged. Students must register with an Independent Study form (available in 140 Roberts Hall).
Hours to be arranged. Staff.
Independent research on current problems selected from any phase of crop science, atmospheric science, or soil science.

Atmospheric Science

SCAS 131 Basic Principles of Meteorology
Fall. 3 credits.
Lecs, T R 11:15; lab, T W or R 1:25–4:25 and M W 7:00–9:30 p.m.
M. W. Wysocki.
A simplified treatment of the structure of the atmosphere: heat balance of the earth; general and secondary circulations; air masses, fronts, and cyclones; and hurricanes, thunderstorms, tornadoes, and atmospheric condensation. In the laboratory, emphasis is on techniques of analysis of weather systems.

SCAS 231 Climate and Climate Change: Introduction to Climatology
Fall. 3 credits. Prerequisite: SCAS 131 or instructor's approval.
Lecs M W F 9:05–9:55. K. H. Cook.
Study of the features of today's climate, including a discussion of the processes that maintain the observed atmospheric circulation, moisture, and temperature distributions. Investigation of past climates and a survey of current climate change issues.

SCAS 250 Meteorological Observations and Instruments
Spring. 3 credits. Prerequisite: SCAS 131.
Lecs, M W 12:20; lab, R 1:25–3:20.
M. W. Wysocki.
Methods and principles of meteorological measurements and observations, including surface, free-air, and remote systems. Instrument siting, mounting, and protection. Instrument response characteristics, calibration, and standardization. Recorders and data-logging systems. Laboratory exercises in observation and data analysis. Intended to serve as preparation for Observers Examination. Lab fee, $45.

SCAS 334 Microclimatology
Spring. 3 credits. Recommended: a course in physics.
T R 10:10–11:25. D. S. Wilks.
The relationships of radiant energy, temperature, wind, and moisture in the atmosphere near the ground. The interplay between physical processes of the atmosphere, plant canopies, and soil is examined, with emphasis on the energy balance.

SCAS 342 Theoretical Meteorology I
Spring. 3 credits. Prerequisites: one year of calculus and one semester of physics.
M W F 10:10. W. W. Knapp.
Introduction to the thermodynamics and hydrostatics of the atmosphere and to the methods of description and quantitative analysis used in meteorology. Topics covered include thermodynamic processes of dry air, water vapor and moist air, and concepts of hydrostatics and stability.

[SCAS 343 Theoretical Meteorology II
Fall. 3 credits. Prerequisites: one year each of calculus and physics. Not offered 1992–93.
M W F 10:10. W. W. Knapp.
Introduction to atmospheric dynamics and to the methods of description and quantitative analysis used in meteorology. Topics considered include equations of atmospheric motion, motion in the free atmosphere, vertical variations of wind and pressure fields, mathematical representation and characteristics of fronts, mechanisms of pressure change, concepts of circulation and vorticity, and effects of friction on atmospheric motion.]

[SCAS 352 Synoptic Meteorology I
Fall. 3 credits. Prerequisites: SCAS 131 and one year of calculus. Not offered 1992–93.
Lecs, T R 9:05; lab, M 1:25–3:20.
S. J. Colucci.
An introduction to methods and principles of weather forecasting and analysis, including weather data plotting and analysis, interpretation of radar and satellite imagery and National Meteorological Center forecast guidance products, and description of the structure and behavior of weather systems.]

SCAS 353 Application of Fortran in Meteorology
Fall. 3 credits. Prerequisites: SCAS 131 plus one computer programming course.
Lec, T R 12:20–1:10; lab, F 1:25–3:20.
M. W. Wysocki.
An introduction to numerical techniques using Fortran to solve meteorological problems. No previous experience with Fortran is expected.

SCAS 354 Forecasting and Dynamics Lab
Spring. 3 credits. Prerequisites: concurrent registration in SCAS 342.
Lec, T R 12:20–1:10; lab, F 1:25–3:20.
M. W. Wysocki.
An application course in atmospheric dynamics using surface and upper-air charts, plus discussion of operational forecast models. Continued tutorials in the Fortran language including geostrophic and thermal winds, divergence, vorticity, and introduction to quasi-geostrophic theory. In addition there will be weather briefings by students based on real-time operational guidance. The flavor of the class will be "how-to" rather than theoretical.

SCAS 357 Atmospheric Air Pollution
Fall. 3 credits. Prerequisites: SCAS 342 and one semester of chemistry or permission of instructor. Offered alternate years. Offered 1992–93.
M W F 11:15–12:05. M. W. Wysocki.
Course will examine sources, effects, transport, measurement, and controls of air pollution. The basic principles in each area will be discussed with an emphasis on their local, regional, and global impacts.

SCAS 435 Statistical Methods in Meteorology
Fall. 3 credits. Prerequisite: an introductory course in statistics (e.g., STATS 215 or AG EC 310) and calculus. Offered alternate years.
T R 10:10–11:25. D. S. Wilks.
Statistical methods used in climatology operational weather forecasting and selected meteorological research applications. Some statistical characteristics of meteorological data, including probability distributions, intercorrelations, and persistence. Operational forecasts derived from multiple regression models, including the MOS system. Forecast verification techniques and scoring rules. Time series analysis, EOFs, and other research topics as time permits.

SCAS 444 Tropical Meteorology
Spring. 3 credits. Prerequisites: SCAS 343 or instructor's approval. Offered alternate years. Offered 1992–93.
M W F 11:15–12:05. K. H. Cook.
Structure and dynamics of the tropical atmosphere on a wide range of time and space scales ranging from meso-scale convective systems to planetary waves. Topics include hurricanes, monsoonal circulation, and El Nino.

[SCAS 446 Atmospheric Modeling
Spring. 3 credits. Prerequisites: SCAS 343, 451 or instructor's approval. Offered alternate years. Not offered 1992–93.
M W F 11:15–12:05. K. H. Cook.
Numerical models of the atmosphere, including simple climate, general circulation, and numerical weather prediction models. We will focus on choosing a set of governing equations for a particular application and translating that system into a diagnostic or predictive model.]

SCAS 447 Physical Meteorology
Fall. 3 credits. Prerequisites: a year each of calculus and physics. Offered alternate years.
M W F 10:10. W. W. Knapp.
Primarily a survey of natural phenomena of the atmosphere, with emphasis on their underlying physical principles. Topics include composition and structure of the atmosphere, atmospheric optics, acoustics and electricity, solar and terrestrial radiation, and principles of radar probing of the atmosphere.

SCAS 451 Synoptic Meteorology II
Spring. 3 credits. Prerequisite: permission of instructor.
Lecs, T R 9:05; lab, M 1:25–3:20.
S. J. Colucci.
Application of principles of theoretical meteorology to the diagnosis and prediction of weather systems such as mid-latitude cyclones, anticyclones and fronts, tropical cyclones, thunderstorms and related phenomena, and lake-effect snow squalls.

SCAS 456 Mesoscale Meteorology
Fall. 3 credits. Prerequisite: permission of instructor. Offered alternate years.
M W F 12:20–1:10. S. J. Colucci.
Structure and dynamics of mid-latitude mesoscale weather systems such as squall lines, convective complexes, precipitation bands, downslope windstorms, mountain breezes, sea breeze circulations, and lake effect snowstorms.

SCAS 692 Special Topics in Atmospheric Sciences
Fall or spring. 1–6 credits. S-U grades optional.
Hours to be arranged. Staff.
Study of topics in atmospheric science that are more specialized or different from other courses. Special topics to be covered will depend on staff and student interests.

SCAS 791 Meteorology Seminar
Fall or spring. Prerequisite: permission of instructor.
Hours to be announced. Staff.
Subjects such as weather modification, paleoclimatology, and atmospheric pollution.

SCAS 859 Master's Level Thesis Research in Meteorology
Fall or spring. Credit by arrangement. Limited to students in the graduate field. S-U grades optional.
Hours by arrangement.

SCAS 959 Doctoral-Level Thesis Research in Meteorology
Fall or spring. Credit by arrangement. Limited to students in the graduate field. S-U grades optional.
Hours by arrangement.

Crop Science

SCAS 311 Grain Crops
Fall. 4 credits. Prerequisite: SCAS 260 or BIO S 241.
Lecs, M W F 10:10; lab, M or T 1:25–4:25. 1 or 2 field trips during lab periods (until 5 p.m. or on weekends). R. L. Obendorf.
Principles of field-crop growth, development and maturation, species recognition, soil and climatic adaptations, liming and mineral nutrition, weed control, cropping sequences, management systems, and crop improvement are considered. Grain, protein, fiber, and sugar crops are emphasized.

SCAS 312 Forage Crops
Spring. 4 credits. Prerequisites: SCAS 260 or BIO S 241 or equivalent. Recommended: AN SC 212.
Lecs, M W F 11:15; lab, M or T 1:25–4:25. G. W. Fick
The production and management of crops used for livestock feed are considered in terms of establishment, growth, maintenance, harvesting, and preservation. Forage grasses, forage legumes, and corn are emphasized, and consideration is given to their value as livestock feed in terms of energy, protein, and other nutritional components.

[SCAS 314 Production of Tropical Crops
Spring. 3 credits. Prerequisite: a course in crop production. Not offered 1992–93.
Lecs, M W F 10:10. Staff.
An introduction to the characteristics and culture of the principal food staple crops of the tropics and subtropics and of some of the crops grown for export. Vegetables and fruits are not emphasized.]

SCAS 315 Weed Science
Fall. 3 credits. Prerequisite: introductory course in biology or botany.
Lecs, T R 9:05; lab, M, T, or W 2–4:25. J. M. DiTomaso.
Principles of weed science are examined. Emphasis is on (a) weed ecology, (b) chemistry of herbicides in relation to effects on the environment and plant growth, and (c) control of weeds in crops. Laboratory covers weed identification and ecology, herbicide selectivity, symptomology, and behavior in soil.

[SCAS 317 Seed Science and Technology
Fall. 3 credits. Prerequisite: BIO S 241 or equivalent. Offered alternate years. Not offered 1992–93.
Lecs, T R 11:15; lab R 1:25–4:25; 2 all-day field trips will be scheduled during the semester. A. G. Taylor, Geneva Experiment Station (Ithaca contact, R. L. Obendorf).
The principles and practices involved in the production, harvesting, processing, storage, testing, quality management, certification, and use of high-quality seed from improved cultivars. Information is applicable to various kinds of agricultural seeds.]

SCAS 608 Water Status in Plants and Soils
Fall. 1 credit. Prerequisite: permission of instructor. S-U grades only. Offered alternate years.
Lec, 1 hour to be arranged; lab, R 1:25–4:25 or as arranged. T. L. Setter.
Techniques for field appraisal of the status of water in plants and soil, including methods used in physiological studies.

[SCAS 610 Physiology of Environmental Stresses
Spring. 3 credits. Prerequisite: BIO S 242 or 341. Offered alternate years. Not offered 1992–93.
Lecs, T R 10:10–11:25. P. L. Steponkus.
A study of the responses of plants to environmental stresses, with emphasis on thermal stresses including chilling, freezing, and high temperature injury. Emphasis is on the physiological and biochemical basis of injury and plant resistance mechanisms at the whole-plant, cellular, and molecular levels.]

SCAS 612 Seed Physiology
Spring. 3 credits. Prerequisite: plant physiology.
T R 8:30–9:55. R. L. Obendorf.
Morphology, physiology, and biochemistry of cereal, legume, and oil-seed formation, composition, storage, and germination. Emphasis is on the deposition of seed reserves during seed formation, stabilization of reserves during storage, and mobilization of reserves during germination. Topics range from on-farm problems to molecular mechanisms.

SCAS 613 Physiology and Ecology of Yield
Spring. 3 credits. Prerequisite: plant physiology.
M W F 12:20. T. L. Setter.
A study of the constraints on crop productivity from a physiological perspective. Influence of environment and genetics on the assimilation, translocation, and partitioning of carbon and nitrogen during crop ontogeny. Emphasis on growth processes of vegetative plant organs.

SCAS 614 Advances in Weed Science
Spring. 2 credits. Prerequisite: SCAS 315 or equivalent. Offered alternate years.
Lec and labs to be arranged. J. M. DiTomaso.
In-depth examination of the biology and ecology of weed-crop interactions and herbicide behavior in soils and plants. Topics include a detailed understanding of herbicide mode of action, selectivity, resistance, and soil persistence. Important herbicide families will be emphasized, particularly those in current use. Cultural and biological weed control methods, herbicide-stress interactions, groundwater contamination, and public perception of pesticides will also be discussed.

SCAS 642 Plant Mineral Nutrition (also Biological Sciences 642)
Spring. 3 credits. Prerequisite: BIO S 341 or equivalent. Offered alternate years.
Lecs, M W F 10:10–11. L. V. Kochian, R. M. Welch.
A detailed study of the processes by which plants acquire and utilize mineral nutrients from the soil. Topics will include the uptake, translocation, and compartmentation of mineral elements; root-soil interactions; metabolism of mineral elements; the involvement of mineral nutrients in various physiological processes; and nutrition of plants adapted to extreme environmental stresses (e.g., acid soils). Specific mineral elements will be emphasized to illustrate the above topics.

SCAS 690 Root-Soil Interactions
Fall or spring. 1–2 credits. S-U grades optional.
Hours to be arranged. R. W. Zobel.
A topic dealing with root-soil interaction will be selected during the first meeting of the term. Students will prepare one or two seminars based on published work on the topic. Possible topics include root genetics, root morphology, conservation tillage, and soil temperature.

SCAS 691 Special Topics in Crop Science
Fall or spring. 1–6 credits. S-U grades optional.
Hours to be arranged. R. Radulovich.
Study of topics in crop science that are more specialized or different from other courses. Special topics to be offered will depend on staff and student interests.

SCAS 695 Planning and Reporting Research
Fall. 2 credits. Prerequisite: graduate student status or permission of the instructor. Limited to 10 students.
Lec to be arranged. G. W. Fick.
This course is designed to prepare students in the SCAS Department and closely related fields for planning their graduate research and reporting research results. Emphasis is given to literature reviews, scientific writing and reviewing (either thesis proposals, grant proposals, or manuscripts for publication), and slide and poster presentations. Students are expected to work closely with their major professor as well as the instructor of the course.

SCAS 829 Master's-Level Thesis Research in Crop Science
Fall or spring. Credit by arrangement. Limited to students in the graduate field. S-U grades optional.
Hours by arrangement.

SCAS 929 Doctoral-Level Thesis Research in Crop Science
Fall or spring. Credit by arrangement. Limited to students in the graduate field. S-U grades optional. Hours by arrangement.

Remote Sensing

[SCAS 461 Remote Sensing: Environmental Applications (also Civil and Environmental Engineering 411)
Spring. 3 credits. Prerequisite: permission of instructor. Not offered 1992–93.
Lecs, T R 10:10; lab, T 2:30–4:25 (a second lab sec will be scheduled if more than 15 students register). W. R. Philipson.
A survey of how remote sensing is applied in various environmental disciplines. Laboratory emphasis is on using aircraft and satellite imagery for inventorying and monitoring surface features in engineering, planning, agriculture, and natural resource assessments.]

SCAS 660 Remote Sensing Fundamentals (also Civil and Environmental Engineering 610)
Fall. 3 credits. Prerequisite: permission of instructor.
Lecs, T R 10:10; lab, T 2:30–4:25. W. D. Philpot.

An introduction to equipment and methods used in obtaining information about earth resources and the environment from aircraft or satellite. Coverage includes sensors, sensor and ground-data acquisition, data analysis and interpretation, and project design.

Soil Science

SCAS 260 Introduction to Soil Science
Spring. 4 credits. Prerequisite: CHEM 103, 207 or 215. S-U grades optional.
Lecs, M W F 9:05; lab, M T W or R 1:25.
R. B. Bryant.
A comprehensive introduction to the field of soil science, with emphasis on scientific principles and their application to solving soil management problems. The laboratory exercises stress quantitative measurement of soil properties.

SCAS 321 Soil and Water Management
Spring. 2 credits. Prerequisites: SCAS 190 or 260. Concurrent registration in ABEN 321 required. S-U grades optional.
Lec, M W 9:05; disc, M 1:25–4:25.
T. W. Scott, M. F. Walter.
An interdisciplinary course intended to introduce students to the general principles of soil and water interaction and to the effects of human intervention in these processes. Aspects of soil and water management, including hydrology, soil erosion, irrigation, drainage, and water quality are examined. Case studies from both the United States and the tropics are used to illustrate basic principles.

SCAS 362 Soil Morphology
Fall. 1 credit. Undergraduates only. Recommended for sophomores and juniors.
R 1:25–4:25; all-day field trip required.
R. B. Bryant, J. M. Galbraith.
The principles for field identification of soil properties, profiles, and landscapes are presented. A series of soil pits are examined, described, classified, and interpreted in the field.

SCAS 363 Intermediate Soil Science I: Genesis, Classification, and Survey
Fall, weeks 1-7. 2 credits. Prerequisite: SCAS 260.
Lecs, M W F 10:10; lab, W 1:25–4:25.
One all-day field trip is required.
R. B. Bryant.
Factors and processes of soil formation. Principles of field identification, classification, survey, and interpretation. Laboratory exercises and field trips provide practical training in soil morphology and landscape relations. Course ends at mid-semester and is part of a sequence of three Intermediate Soil Science courses.

SCAS 364 Intermediate Soil Science II: Physics
Fall, weeks 8–14. 2 credits. Prerequisites: SCAS 260, one year of calculus and consent of instructor.
Lecs, M W F 10:10; lab, W 1:25–4:25.
P. Baveye.
Description and measurement of the status of water in soils. Theory of water, solute, and heat transport. Infiltration, drainage, and redistribution. Weekly laboratory and problem-solving sessions illustrate the concepts introduced in class. Course starts at mid-semester and is part of a sequence of three intermediate Soil Science courses.

SCAS 365 Intermediate Soil Science III: Chemistry and Microbiology
Spring. 3 credits. Prerequisite: SCAS 260.
T R 10:10–11:30. M. McBride and M. Alexander.
The chemical properties and microorganisms of soil and the chemical reactions and transformations occurring in soil. This course is part of a sequence of three intermediate Soil Science courses.

SCAS 371 Hydrology and the Environment (also Agricultural and Biological Engineering 371, Civil and Environmental Engineering 334, and Geological Sciences 204)
Spring. 3 credits. Students enrolled in the statutory colleges must enroll in ABEN 371 or SCAS 371. Prerequisite: 1 course in calculus.
Lecs, T R 9:05; lab, F 1:25–3:20.
T. S. Steenhuis, J.-Y. Parlange, M. F. Walter, P. C. Baveye, W. H. Brutsaert, L. M. Cathles.
Introduction to hydrology as a description of the hydrologic cycle and the role of water and chemicals in the natural environment. Includes precipitation, infiltration, evapotranspiration, groundwater, surface runoff, river meandering floods, and droughts. Case studies, short field trips, computer programs, and laboratories are used to foster an understanding of concepts and principles of hydrologic processes.

SCAS 372 Soil Fertility Management
Fall. 3 credits. Prerequisite: SCAS 260 or permission of instructor.
M W F 9:05. D. R. Bouldin.
An integrated discussion of soil crop yield relationships, with emphasis on the soil as a source of mineral nutrients for crops and the role of fertilizers and manure in crop production.

SCAS 373 Soil, Water, and Aquatic Plants
Fall. 3 credits. Prerequisites: SCAS 260, BIO S 101–102, and CHEM 103–104 or equivalents.
Lec, T R 11:15; lab, T 1:25–4:25.
J. H. Peverly.
The success or failure of soil and water management is manifested in streams, wetlands, lakes, and aquifers. Chemical and biological changes downstream are studied and related to agricultural management techniques upstream. Basic chemical and physiological processes are presented and used to suggest appropriate responses to water management problems.

SCAS 385 Biogeochemical Cycles, Agriculture, and the Environment
Spring. 2 credits. Prerequisites: CHEM 103 or 207 and SCAS 260 or equivalent.
Lecs, T R 11:15–12:05. J. M. Duxbury.
The impact of agriculture on aspects of the global biogeochemical cycles of carbon, nitrogen, sulfur, and phosphorus is discussed and illustrated with current agricultural and environmental issues. Topics include sustainable agriculture, effects of nitrogen fixation, acid rain, global warming, and land disposal of wastes.

SCAS 398 Environmental Microbiology (also Biological Sciences 398)
Spring. 3 credits. Prerequisites: BIO S 290 or BIO S 261 or SCAS 260 or permission of instructor. Offered alternate years.
M W F 10:10. M. Alexander and W. C. Ghiorse.
Behavior and function of microorganisms in natural environments and the role of microorganisms in transformation of pollutants.

SCAS 471 Properties and Appraisal of Soils of the Tropics
Fall. 3 credits. Prerequisite: SCAS 260 or equivalent. S-U grades optional. No audits accepted.
Lecs, T R 10:10; disc, W 2:30–4:25.
A. Van Wambeke.
An in-depth study of the properties of the soils of the tropics. The course is designed for students with an interest in, or experience of, tropical countries, who wish to increase their knowledge of the development potential of the land resources in the third world. The course examines the conditions in which soils form, and considers ecological, geological and vegetational factors that produce the diversify that exists among them. The major kinds of soils are recognized, their management properties described, and methods to alleviate the constraints to crop production examined. Topics include the identification of soils, and their functions in sustaining traditional farming systems and advanced technological packages. The course pursues these themes reviewing the most recent sources of information generated in tropical countries and published in Latin-American, Francophone, and English journals. The last part of the course gives special attention to salt-affected soils, paddy rice cultivation and the characteristics of acid-sulfate soils. The objectives of the course are reached by lectures, discussion sessions, and independent readings.

SCAS 473 Ecology of Agricultural Systems (also Biological Sciences 473)
Fall. 3 credits. Limited to 45 students. Prerequisite: BIO S 261 or permission of instructor. S-U grades optional. Offered alternate years.
Lec and disc, T R 2:30–3:45. During the first 6 weeks of class the Thursday meetings may run to 5:00 because of field trips. T. W. Scott and A. G. Power.
Analysis of the ecological processes operating in agricultural systems, with an emphasis on the interactions between organisms. Topics include nutrient dynamics in agroecosystems, plant competition and facilitation, intercropping, the ecology of species invasions, mutualism in agroecosystems, plant-herbivore relations, plant-pathogen interactions, biological pest control, and evolutionary processes in agriculture. Case studies from both the tropics and the temperate zone are used to illustrate important concepts.

SCAS 483 Environmental Biophysics
Fall. 3 credits. Prerequisite: SCAS 260 or equivalent or permission of instructor.
Lecs, M W F 11:15. S. J. Riha.
Introduction to basic principles of energy and water transfer and storage in soil-plant systems. Energy budgets, soil heat flow, water movement in saturated and unsaturated soils, evapotranspiration, and water dynamics in the soil-plant-atmosphere continuum will be covered. Applications to agronomic and environmental problems and instrument design and use are considered through discussion and problems sets.

SCAS 663 Pedology
Spring. 3 credits. Prerequisite: SCAS 361 or permission of instructor. Offered alternate years. Textbook recommended, not required.
Hours to be arranged. R. B. Bryant.

Weathering, reactions, and processes of soil genesis. Principles of soil classification and the rationale and utilization of soil taxonomy. Development and significance of major groups of soils of the world.

SCAS 666 Advanced Soil Microbiology
Fall. 1 credit. Prerequisite: SCAS 476 or permission of instructor. S-U grades only for graduate students.
T 12:20. M. Alexander.
Discussions of current topics in special areas of soil microbiology. Particular attention is given to biochemical problems in microbial ecology.

SCAS 667 Advanced Soil Physics
Spring. 3 credits. Prerequisites: One year of college physics and SCAS 483 or permission of instructor. S-U grades optional. Offered alternate years.
Hours to be arranged. P. Baveye.
A detailed study of measurement processes and of the hydrostatics of aqueous solutions in soils and porous media, with emphasis on fundamental principles. Examination of the molecular aspects of water-solid interactions, including shrink-swell phenomena and the properties of absorbed water. Analysis of equilibrium water adsorption from thermodynamical and mechanistic (molecular) standpoints. Mechanical and thermodynamical analysis of the equilibrium status of aqueous solutions in deformable soils. Formal lectures are complemented by tutorial sessions.

SCAS 669 Organic Matter—Soils, Sediments, and Waters
Spring. 2 or 3 (with discussion) credits. Prerequisites: SCAS 260 and CHEM 357–358 or equivalent.
T R 9:05; disc W 1:25–2:15.
J. M. Duxbury.
A discussion of current concepts on the chemical nature, dynamics, and properties of natural organics and organo-mineral associations in terrestrial and aquatic environments. Interaction with anthropogenic organics and effects of anthropogenic activities on natural organics are considered.

[SCAS 671 Soil Chemistry
Fall. 3 credits. Prerequisite: one year of physical chemistry or permission of instructor. Offered alternate years. Not offered 1992–93.
Lecs, M W F 11:15. M. B. McBride.
A detailed examination of the structure and surface chemistry of minerals common to soils. Ion exchange, mineral-solution equilibria, and adsorption reactions of silicate clays and oxides will be emphasized.]

SCAS 675 Modeling the Soil-Plant-Atmosphere System
Spring. 3 credits. Prerequisite: SCAS 483 or equivalent and COM S 100 or equivalent. Offered alternate years.
Lecs, T R 1:25–2:45. J. L. Hutson, S. J. Riha.
Derivation of dynamic simulation models of soil-plant-atmosphere systems and their application. Models will include water, plant nutrients, and pesticide transport and their interaction with soil and plants. Students will develop their own models and apply existing models to environmental and plant production problems.

SCAS 681 Soil Physics Research Seminar
Fall. 1 credit. Open to graduate students.
To be arranged. P. Baveye, J. Hutson, H. van Es.
Discussions of current topics in special areas of soil physics and presentation of research carried out by participants.

SCAS 693 Special Topics in Soil Science
Fall or spring. 1–6 credits. S-U grades optional.
Hours to be arranged. Staff.
Study of topics in soil science that are more specialized or different from other courses. Special topics to be covered will depend on staff and student interests.

[SCAS 774 Soil Fertility Advanced Course
Spring. 3 credits. Prerequisite: graduate status with a major or minor in agronomy. Offered alternate years. Not offered 1992–93.
T R 8:30–9:55. D. R. Bouldin.
A study of selected topics in soil-crop relationships, with emphasis on concepts of soil fertility, interpretation of experimental data, and soil fertilizer chemistry.]

SCAS 889 Master's-Level Thesis Research in Soil Science
Fall or spring. Credit by arrangement. Limited to students in the graduate field. S-U grades optional.
Hours by arrangement.

SCAS 989 Doctoral-Level Thesis Research in Soil Science
Fall or spring. Credit by arrangement. Limited to students in the graduate field. S-U grades optional.
Hours by arrangement.
Courses in "Remote Sensing" are also listed under the Department of Civil and Environmental Engineering in the College of Engineering.

STATISTICS AND BIOMETRY

C. E. McCulloch, chair; N. S. Altman, G. Casella, C. Castillo-Chavez, G. A. Churchill, S. J. Schwager, S. R. Searle

Courses in statistics and biometry are offered by the Biometrics Unit in the Department of Plant Breeding and Biometry.

STATS 200 Statistics and the World We Live In
Spring. 3 credits.
Lecs, T R 10:10–11:25; disc, 1 hr. to be arranged. N. S. Altman.
Major concepts and approaches of statistics are presented at an introductory level. Three broad areas are covered: collecting data, organizing data, and drawing conclusions from data. Topics include sampling, statistical experimentation and design, measurement, tables, graphs, measures of center and spread, probability, the normal curve, confidence intervals, and statistical tests.

STATS 215 Introduction to Statistical Methods
Fall. 3 credits. Prerequisite: STATS 200 is recommended for students with no prior experience in data collection and interpretation.
Lecs, M W F 11:15; lab, 1 hr. to be arranged. C. E. McCulloch.
Statistical methods are developed and used to analyze data arising from the biological sciences. Topics include point and confidence interval estimation, hypothesis testing, t-tests, correlation, simple linear regression, and analysis of variance and multiple regression. Statistical computing is taught and used throughout the course. Emphasis is on proper use of statistical methodology and interpretation of statistical analyses.

STATS 408 Theory of Probability
Fall. 4 credits. Prerequisite: MATH 112, 122, or 192, or permission of instructor.
Lecs, M W F 10:10; disc, M 3:35–5. Staff.
An introduction to probability theory: foundations, combinatorics, random variables and their probability distributions, expectations, generating functions, and limit theory. Biological and statistical applications are the focus. Can serve as either a one-semester introduction to probability or a foundation for a course in the theory of statistics.

STATS 409 Theory of Statistics
Spring. 4 credits. Prerequisite: STATS 408 or equivalent.
Lecs, M W F 10:10; disc, M 3:35–5. Staff.
The concepts developed in STATS 408 are applied to provide an introduction to the classical theory of parametric statistical inference. Topics include sampling distributions, parameter estimation, hypothesis testing, and linear regression. Students seeking applied courses in statistical methodology should consider STATS 601–602 or STATS 215.

STATS 417 Matrix Algebra
Fall. 3 credits. Prerequisite: precalculus mathematics.
Lecs, M W F 9:05; disc, M 1:25–3:10. S. R. Searle.
Definitions, basic operations and arithmetic, determinants, and the inverse matrix. Rank, linear dependence, canonical forms, linear equations, generalized inverses and eigenroots and vectors. Emphasis is on understanding basic ideas and on developing skills for applying matrix algebra.

STATS 451 Mathematical Modeling of Populations
Fall. 3 credits. S-U grades optional. Prerequisites: MATH 111 and 112, or equivalent. Offered alternate years.
Lecs, M W F 1:25–2:15.
C. Castillo-Chavez.
This course concentrates in the analysis and simulation of mathematical models, and it will focus in the study of models relevant to population genetics and population biology. Mathematical techniques that are relevant to these areas will be presented. The course will emphasize stochastic and deterministic models. Computer simulations and the use of mathematical packages will be an integral part of this course.

STATS 495 Statistical Consulting
Spring. 2 credits. S-U grades only. Limited to undergraduates. Prerequisites or co-requisites: STATS 409 and 602 and permission of instructor.
Lec, W 1:25–2:15 plus 1 hr. of consulting to be arranged. Staff.
Participation in the Biometrics Unit consulting service: faculty-supervised statistical consulting with researchers from other disciplines. Discussion sessions for joint consideration of selected consultations encountered during previous weeks.

STATS 497 Undergraduate Special Topics
Fall or spring. 1–3 credits. Students must register with an Independent Study form (available in 140 Roberts Hall). S-U grades optional.

Staff.
Can consist of individual tutorial study or a course of lectures (or both) selected by the faculty. Since topics usually change from year to year, this course may be repeated for credit.

STATS 498 Undergraduate Supervised Teaching
Fall or spring. 2 credits. Students must register with an Independent Study form (available in 140 Roberts Hall). S-U grades only.
Staff.
Students assist in teaching a course appropriate to their previous training. Students will meet with a discussion or laboratory section and regularly discuss objectives with the course instructor.

STATS 499 Undergraduate Research
Fall or spring. 1–3 credits. Limited to statistics and biometry undergraduates. Prerequisite: permission of faculty member directing research. Students must register with an Independent Study form (available in 140 Roberts Hall). S-U grades optional.
Staff.

STATS 600 Statistics Seminar
Fall or spring. 1 credit. S-U grades only.
Sem, W 3–4:30. Staff.

STATS 601 Statistical Methods I
Fall. 4 credits. Limited to graduate students; others by permission of the instructor.
Lecs, M W F 12:20; lab, 1 hr. and 30 min. to be arranged. G. A. Churchill.
Statistical methods are developed and used to analyze data arising from a wide variety of applications. Topics include descriptive statistics, point and interval estimation, hypothesis testing, inference for a single population, comparisons between two populations, one- and two-way analysis of variance, comparisons among population means, analysis of categorical data, and correlation and regression analysis. Interactive computing is introduced through MINITAB statistical software. Emphasis is on basic principles and criteria for selection of statistical techniques.

STATS 602 Statistical Methods II
Spring. 4 credits. Limited to graduate students; others by permission of instructor. Prerequisite: STATS 601 or equivalent.
Lecs, M W F 11:15; lab, 1 hr. and 30 min. to be arranged. S. J. Schwager.
A continuation of Statistics 601. Emphasis is on the use of multiple regression analysis, analysis of variance, and related techniques to analyze data in a variety of situations. Topics include an introduction to data collection techniques; least squares estimation; multiple regression; model selection techniques; detection of influential points, goodness-of-fit criteria; principles of experimental design; analysis of variance for a number of designs, including multi-way factorial, nested, and split plot designs; comparing two or more regression lines; and analysis of covariance. Emphasis is on appropriate design of studies prior to data collection, and the appropriate application and interpretation of statistical techniques. For practical applications, computing is done with the MINITAB and SAS statistical packages.

STATS 603 Statistical Methods III
Fall or spring. 3 credits. Prerequisite: STATS 601 and 602 or permission of instructor. Offered alternate years. Offered spring 1993.
G. A. Churchill.
Categorical data analysis, including logistic regression, loglinear models, combining contingency tables, and applications to case control studies. Statistical aspects of survival analysis, and statistical analyses for clinical trials.

[STATS 604 Statistical Methods IV: Applied Design
Fall or spring. 3 credits. Prerequisites: STATS 601 and 602 or permission of instructor. Offered alternate years. Not offered 1992–93.
Applications of experimental design including such advanced designs as split plots, incomplete blocks, fractional factorials. Use of the computer for both design and analysis will be stressed, with emphasis on solutions of real data problems.]

[STATS 605 Applied Regression Analysis
Fall, 1/3 of the term. 1 credit. Prerequisites: STATS 409 and 602. Offered alternate years. Not offered 1992–93.
A continuation of STATS 602, with emphasis on data analysis including logistic and nonlinear regression.]

STATS 606 Sampling Biological Populations
Fall, 1/3 of the term. 1 credit. Prerequisite: STATS 601 or equivalent. Offered alternate years.
S. V. Stehman.
Standard methods of sample-survey design and estimation are presented, including stratified random sampling, cluster sampling, double sampling, and variable probability sampling. Special emphasis given to methods of particular utility or specifically designed for biological sampling. Examples are taken from forestry, fisheries, and other biological areas.

[STATS 607 Nonparametric and Distribution-Free Statistical Methods
Spring, 1/3 of the term. 1 credit. S-U grades optional. Prerequisite: STATS 601 or equivalent. Offered alternate years. Not offered 1992–93.
Nonparametric and distribution-free alternatives to normal-theory testing procedures are presented: sign or rank tests for one or two populations; analyses for completely randomized and randomized blocks designs; comparisons among several means; correlation and regression; goodness-of-fit; and tests based on randomization of the data.]

STATS 639 Epidemiology Seminar (also Nutritional Sciences 639)
Fall and spring. 1 credit, variable. S-U grades only. Permission of instructor.
Sem, M 12:20. Staff.
This course will develop skills in the preparation and interpretation of epidemiological data by discussing current research topics and issues.

[STATS 642 Advanced Mathematical Methods in Statistics and Biometry
Spring. 3 credits. S-U grades optional. Prerequisites: MATH 411 or 421, or equivalent. Offered alternate years. Not offered 1992–93.
Lecs, T R 12:20–1:50. C. Castillo-Chavez.
This advanced level course will cover classical mathematical methods that are useful in statistics, biometry, and biomathematics, with an introduction to MACSYMA. Topics include: Introduction to MACSYMA, complex numbers and their elementary properties, analytic functions, contour integration, special functions, asymptotic methods, generalized functions, and the Fourier transform. Techniques will be illustrated with examples drawn from statistics, biometry, and biomathematics.]

[STATS 651 Mathematical Population Studies and Modeling
Spring. 3 credits. S-U grades optional. Prerequisites: STATS 408 and 417, or equivalent. STATS 409 is recommended. Offered alternate years. Not offered 1992–93.
Lecs, T R 12:20–1:50. C. Castillo-Chavez.
Model formulation, parameter estimation, and mathematical analysis of stochastic and deterministic models in population dynamics. Emphasis will be put on the interactions between human demography and sociology (human behavior), and their relationship to disease dynamics of microparasitic and macroparasitic infections. The process of pair formation and dissolution and their impact on demography, sociology, and epidemiology will also be studied.]

STATS 662 Mathematical Ecology (also Biological Sciences 662)
Spring. 3 credits. Prerequisites: a year of calculus and a course in probability. Offered alternate years.
Lecs, M W F 12:20. Staff.
Mathematical and statistical analysis of populations and communities: theory and methods. Spatial and temporal pattern analysis, deterministic and stochastic models of population dynamics. Model formulation, parameter estimation, and simulation and analytical techniques.

STATS 681 Topics in Environmental Statistics
Fall and spring. 2 credits. S–U grades optional. Prerequisite: STATS 601 or permission of the instructor.
Lec, R 10:10–11:25. G. Casella.
This course is a discussion group focusing on statistical problems arising in the environmental sciences. These issues are explored in a number of different ways, such as student presentations of research papers, directed readings, and outside speakers.

STATS 697 Special Topics in Statistics and Biometry
Fall, spring, or summer. 1–3 credits. S-U grades optional.
Staff.
Can consist of individual tutorial study or a course of lectures (or both) selected by the faculty. Since topics usually change from year to year, this course may be repeated for credit.

STATS 717 Linear Models
Spring. 3 credits. S-U grades only. Prerequisites: STATS 409 or equivalent and STATS 417 and 602. Offered alternate years.
M W F 11:15. S. R. Searle.
Analysis of variance and estimation procedures for unequal-subclass-numbers data. Cell means models for the 1-way classification, nested classifications, and the 2-way crossed classification, both with and without interactions; introduction to multinormal variables and the distribution of quadratic forms. The general linear model (in matrix and vector form), estimable functions, and testable hypotheses. Overparameterized models, restricted models, multifactor cases, covariables, computing.

[STATS 718 Variance Components
Spring. 3 credits. S-U grades only. Prerequisite: STATS 717. Offered alternate years. Not offered 1992–93.
Several methods of estimating variance components are explained and compared: for balanced data (equal subclass numbers), the analysis of variance method; for unbalanced data (unequal subclass numbers), the three Henderson methods and the methods of maximum likelihood, restricted maximum likelihood, and minimum norm quadratic unbiasedness. Also included: estimation from mixed models, prediction of random variables, the dispersion-mean model, and computer package output for variance component estimation.]

STATS 795 Statistical Consulting
Fall and spring. 2 credits. S-U grades only. Limited to graduate students.
Lec, W 1:25 and 1 hr. of consulting to be arranged. Staff.
Participation in the Biometrics Unit consulting service: faculty-supervised statistical consulting with researchers from other disciplines. Discussion sessions for joint consideration of selected consultations encountered by the service during previous weeks. Since consultations usually change from semester to semester, this course may be repeated for credit.

STATS 899 Research
Fall or spring. Credit to be arranged. S-U grades only. Limited to candidates for graduate degrees. Prerequisite: permission of the graduate field member concerned. Research at the M.S. level.

STATS 999 Research
Fall or spring. Credit to be arranged. S-U grades only. Limited to candidates for graduate degrees. Prerequisite: permission of the graduate field member concerned. Research at the Ph.D. level.

VEGETABLE CROPS

See Horticultural Sciences.

FACULTY ROSTER

Abawi, George S., Ph.D., Cornell U. Prof., Plant Pathology (Geneva)
Acree, Terry E., Ph.D., Cornell U. Prof., Food Science, and Technology (Geneva)
Adleman, Marvin I., M. L. A., Harvard U. Prof., Landscape Architecture
Agnello, Arthur M., Ph.D., North Carolina State U. Assoc. Prof., Entomology (Geneva)
Aist, James R., Ph.D., U. of Wisconsin. Prof., Plant Pathology
Albright, Louis D., Ph.D., Cornell U. Prof., Agricultural and Biological Engineering
Aldwinckle, Herbert S., Ph.D., U. of London (England). Prof., Plant Pathology (Geneva)
Alexander, Martin, Ph.D., U. of Wisconsin. Liberty Hyde Bailey Professor of Soil Science, Soil, Crop, and Atmospheric Sciences
Allee, David J., Ph.D., Cornell U. Prof., Agricultural Economics
Altman, Naomi S., Ph.D., Stanford U. Asst. Prof., Plant Breeding and Biometry
Andersen, Robert L., Ph.D., U. of Minnesota. Prof., Horticultural Sciences (Geneva)
Anderson, Bruce L., Ph.D., U. of California at Berkeley. Assoc. Prof., Agricultural Economics
Aneshansley, Daniel J., Ph.D., Cornell U. Assoc. Prof., Agricultural and Biological Engineering
Apgar, Barbara J., Ph.D., Cornell U. Asst. Prof., Animal Science
Aplin, Richard D., Ph.D., Cornell U. Prof., Agricultural Economics
Arneson, Phil A., Ph.D., U. of Wisconsin. Assoc. Prof., Plant Pathology
Austic, Richard E., Ph.D., U. of California at Davis. Prof., Animal Science
Awa, Njoku E., Ph.D., Cornell U. Assoc. Prof., Communication
Baer, Richard A., Ph.D., Harvard U. Prof., Natural Resources
Bandler, David K., M.P.S., Cornell U. Prof., Food Science
Barbano, David M., Ph.D., Cornell U. Prof., Food Science
Barker, Randolph, Ph.D., Iowa State U. Prof., Agricultural Economics
Bartsch, James A., Ph.D., Purdue U. Assoc. Prof., Agricultural and Biological Engineering
Bassuk, Nina L. Ph.D., U. of London (England). Assoc. Prof., Floriculture and Ornamental Horticulture
Batt, Carl A., Ph.D., Rutgers U. Assoc. Prof., Food Science
Bauman, Dale E., Ph.D., U. of Illinois. Prof., Animal Science
Baveye, Philippe C., Ph.D., U. of California at Riverside. Asst. Prof., Soil, Crop, and Atmospheric Sciences
Becker, Robert F., M.S., U. of New Hampshire. Assoc. Prof., Horticultural Sciences (Geneva)
Bedford, Barbara, Ph.D., U. of Wisconsin, Madison. Asst. Prof., Natural Resources
Beer, Steven V., Ph.D., U. of California at Davis. Assoc. Prof., Plant Pathology
Beermann, Donald H., Ph.D., U. of Wisconsin. Assoc. Prof., Animal Science
Bell, Alan W., Ph.D., U. of Glasgow (Scotland). Assoc. Prof., Animal Science
Bellinder, Robin R., Ph.D., Virginia Polytechnic Inst. and State U. Assoc. Prof., Fruit and Vegetable Science
Bergstrom, Gary C., Ph.D., U. of Kentucky. Assoc. Prof., Plant Pathology
Berkey, Arthur L., Ph.D., Michigan State U. Prof., Education
Bills, Nelson L., Ph.D., Washington State U. Assoc. Prof., Agricultural Economics
Bjorkman, Thomas N., Ph.D., Cornell U. Asst. Prof., Horticultural Sciences (Geneva)
Blake, Robert W., Ph.D., North Carolina State U. Prof., Animal Science
Blanpied, George D., Ph.D., Michigan State U. Prof., Fruit and Vegetable Science
Boisvert, Richard N., Ph.D., U. of Minnesota. Prof., Agricultural Economics
Bouldin, David R., Ph.D., Iowa State U. Prof., Soil, Crop, and Atmospheric Sciences
Bourne, Malcolm C., Ph.D., U. of California at Davis. Prof., Food Science and Technology (Geneva)
Boyd, R. Dean, Ph.D., U. of Nebraska. Assoc. Prof., Animal Science
Brady, John W., Jr., Ph.D., SUNY at Stonybrook. Assoc. Prof., Food Science
Brake, John R., Ph.D., North Carolina State U. W.I. Myers Professor of Agricultural Finance, Agricultural Economics
Broadway, Roxanne M., Ph.D., U. of California at Davis. Asst. Prof., Entomology (Geneva)
Brown, David L., Ph.D., U. of Wisconsin. Professor, Rural Sociology
Brown, Susan K., Ph.D., U. of California at Davis. Assoc. Prof., Horticultural Sciences (Geneva)
Bryant, Ray B., Ph.D., Purdue U. Assoc. Prof., Soil, Crop, and Atmospheric Sciences
Burr, Thomas J., Ph.D., U. of California at Berkeley. Prof., Plant Pathology (Geneva)
Butler, Walter R., Ph.D., Purdue U. Prof., Animal Science
Buttel, Frederick H., Ph.D., U. of Wisconsin. Prof., Rural Sociology
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Freshmen in the fine arts department are assigned faculty advisers for the first year. Students may then choose advisers in their major area of concentration.

Undergraduate students in the Program of Urban and Regional Studies are assigned faculty advisers.

All students in the college are invited to share their concerns and seek advice from the volunteer student advisers at anytime.

Specific inquiries regarding rules, procedures, or deadlines should be addressed to:

Vince Mulcahy, interim chair, Department of Architecture

Richard S. Booth, chair, Department of City and Regional Planning

Victor Kord, chair, Department of Art.

DEGREE PROGRAMS

	Degree
Architecture	B.Arch.
	B.F.A.
Fine Arts	B.F.A.
History of Architecture and Urbanism	B.S.
Urban and Regional Studies	B.S.

The college offers programs leading to the bachelor's degree—the five-year program in architecture leads to the Bachelor of Architecture; four-year programs in art and architecture lead to the Bachelor of Fine Arts. In addition, four-year programs with a concentration in either urban and regional studies or history of architecture lead to the Bachelor of Science.

Graduate-level programs are offered in art, architectural design and urban design, architectural sciences, history of architecture and urbanism, historic preservation planning, city and regional planning, regional science, and landscape architecture.

Students in each of these programs work in physical proximity to one another and thus gain a broader understanding of their own special area of interest through contact with the students and faculty in other disciplines.

Early in its development the college set a limit on the number of students it would enroll and devised a selective method of admission. There are now more than 650 students and a full-time teaching staff of over fifty-five, supplemented by visiting professors and critics, part-time lecturers, and assistants. Teachers and students mix freely, and much instruction and criticism is on an individual basis.

The college's courses are integral parts of the professional curricula. Fundamental subjects are taught by faculty members whose experience provides them with professional points of view. The concentration of professional courses within the college is balanced by the breadth of view gained from courses and informal learning in the rest of the university. The college believes that this breadth is an essential element of professional education. This conviction is evident in the form of the curriculum, the methods of teaching, and the extracurricular life of teachers and students.

FACILITIES

The college occupies Sibley Hall, Olive Tjaden Hall, Rand Hall, and the Foundry. In Sibley are the facilities for architecture, and city and regional planning, as well as administrative offices, the Visual Resource Facility, and the Fine Arts Library. The Department of Art is housed in Olive Tjaden Hall. Sculpture and shop facilities are in the Foundry. The Green Dragon Cafe, a student lounge, is located in the basement of Sibley Dome. The college has three darkrooms that are available for general use by students in the college and serve as laboratories for the photography courses. A darkroom fee must be paid by each user. Information about darkroom rules and regulations, hours, and equipment is available at the darkroom circulation desk.

Through the generosity of the late Lillian P. Heller, the college also owns the Miller-Heller House, home of William H. Miller, the first student to enroll for the study of architecture at Cornell and later a practicing architect in Ithaca. This building is used to house visiting teachers and guests of the college and for occasional receptions and social events.

Libraries

The Fine Arts Library, in Sibley Hall, serves the College of Architecture, Art, and Planning through its collections on architecture, fine arts, city and regional planning and landscape architecture. The library, with more than 138,000 books, is capable of supporting undergraduate, graduate, and research programs. Some 1,900 serials are currently received and maintained.

The Visual Resource Facility, made possible through gifts from George and Adelaide Knight, in Sibley Hall contains the F. M. Wells Memorial Slide Collection, which consists of a large and growing collection of slides of architecture, architectural history, and art. The collection now includes approximately 400,000 slides.

The facilities of the libraries of other schools and departments on campus and the John M. Olin Library, designed primarily as a research library for graduate students, are also available.

Museums and Galleries

The Herbert F. Johnson Museum of Art was formally opened in May 1973. Although many of its exhibitions and activities relate directly to academic programs of the university, the museum has no administrative affiliation with any department. In this way, its programs freely cross academic boundaries, stimulating interchange among disciplines. With a strong and varied collection and a continuous series of high-quality exhibitions, it fulfills its mission as a center for the visual arts at Cornell. Art galleries are also maintained in Willard Straight Hall, where loan exhibitions of paintings and graphic work by contemporary artists are held. Current work of students in the College of Architecture, Art, and Planning is shown in the exhibition areas in Sibley Hall and the gallery in Olive Tjaden Hall.

Rome Program

The College of Architecture, Art, and Planning's Rome Program was founded in the fall of 1986 to provide instruction in Italy for students seeking excellence in art, architecture, and other disciplines. The program offers an educational experience that draws upon the rich past of Rome, its resources in museums, its art and architecture, and its wide variety of cultural offerings. The school is located in the famous Palazzo Massimo in the center of the historical city next to such well-known Roman sights as Piazza Navona, the Pantheon, and Rome's famous outdoor market at the Campo dei Fiori.

The program in Rome offers components for students majoring in liberal arts, architecture, fine arts, and planning. Full course loads are available to all students in a curriculum that stresses the convergence of artistic, cultural, and architectural ideas vital to an understanding of the city. Students are responsible for planning course schedules that ensure their particular requirements can be met, since course offerings in Rome are limited.

COLLEGE ACADEMIC POLICIES

Ownership of Student Work

All drawings, models, paintings, graphic art, and sculpture done in the studios and drafting rooms as a part of the instructional program are the property of the college until they have been graded and released by the instructor. Certain works may be selected by the college for retention for academic purposes.

Exhibitions of Student Work

Exhibitions of student work are held each semester as part of the yearly schedule of the Olive Tjaden Hall gallery and the John Hartell Gallery. These display work from a specific course or exhibit examples of recent work by individual faculty, students, and visitors.

Scholastic Standards

Term by term, a candidate for an undergraduate degree in the college is required to pass all courses in which the student is registered and have a weighted average for the term of not less than C (2.0). The record of each student who falls below the standard will be reviewed by the Student Records Committee for appropriate action, as described below:

1) Warning means that the student's performance is not up to expectations. Unless improvement is shown in the subsequent term, the student may be placed on final warning or required to take a leave of absence from the college.

2) Final Warning indicates that the student's record is unsatisfactory. Unless considerable improvement is shown in the subsequent term, the student shall be required to take a leave of absence from the college.

3) Required leave of absence: Academic Deficiency. The student is dismissed from the college and may not continue studies in the college. A student who has been placed on a required leave of absence may apply for readmission after an absence of at least two semesters. Application for readmission is made by letter, addressed to the department chair. The student must submit evidence that his or her time has been well used, and, if employed, must submit a letter from an immediate superior. If a student chooses to register for courses, either extramurally at Cornell or at another institution, he or she should be advised that credit for these courses will not apply toward the degree but will appear on the student's transcript. The grades received for any courses taken while on a required leave of absence will not be counted into the grade point average. Readmission to the college is at the discretion of the Admissions Committee. Application for spring-term readmission must be made by November 15, and application for fall-term readmission must be made by April 15. Refer to the Architecture, Art & Planning Handbook (Whitebook) for further information regarding required leave of absence.

4) Required withdrawal: May Not Reregister, College of Architecture, Art, and Planning. The student is dismissed from the college and is permanently prohibited from continuing studies in it. This dismissal does not preclude the possibility of applying for admission to another division of the university.

The above actions are not necessarily sequential. A student who has received a warning may be placed on a required leave of absence for academic deficiency at the end of the next term if performance during that time is deemed to be grossly deficient.

A cumulative average of at least C– (1.7) is required for graduation.

ARCHITECTURE

Vince Mulcahy, chair; M. Cruvellier, W. Goehner, D. P. Greenberg, R. Hall, G. Hascup, L. F. Hodgden, M. Jarzombek, G. Jullian de la Fuente, A. Kira, B. G. MacDougall, A. B. Mackenzie, V. Meyers, J. C. Miller, L. Mirin, J. Ochshorn, C. F. Otto, A. Ovaska, C. W. Pearman, A. Pendleton, H. W. Richardson, C. Rowe, M. L. Schack, J. P. Shaw, A. Simitch, S. Thiratrakoolchai, V. K. Warke, J. Wells, M. Woods, J. Zissovici

Professional Degree Program

The first professional degree in architecture is the Bachelor of Architecture. This degree counts toward the professional registration requirements established by the various states, National Architectural Accrediting Board, and the National Council of Architectural Registration Boards. The professional program is normally five years in length and is designed particularly for people who, before they apply, have established their interest and motivation to enter the field. It therefore incorporates both a general and professional educational base.

The program is oriented toward developing the student's ability to deal creatively with architectural problems on analytical, conceptual, and developmental levels. The sequence courses in design, consisting of studio work augmented by lectures and seminars dealing with theory and method, are the core of the program. Sequences of studies in the history of architecture and cities, culture and society, visual studies, environmental science, structures, and building technology provide a base for the work in design.

In the first three years the student has the opportunity to establish a foundation in the humanities and sciences through electives. During the fourth and fifth years this base may expand through detailed further studies in these areas. Within the professional program a basis for understanding architecture in its contemporary and historical cultural contexts is established.

The structure of the program incorporates considerable flexibility for the individual student to pursue his or her particular interest in the fourth and fifth years. By carefully planning options and electives in the fifth year, it is possible for a qualified student to apply the last year's work for the Bachelor of Architecture degree to one of the graduate programs offered in the department. Some students are then able to complete the requirements for the master's degree in one additional year.

Rome Program

The program offers the opportunity for students from Cornell and other universities to spend one or two terms of study in Rome. This option is open to fourth- and fifth-year Cornell architecture students; outstanding third-year students are admitted by petition and a review of their design record. Courses offered by this department include design, thesis, thesis introduction, history, theory, architectural science, and design communication. In addition, courses are offered by other departments in Italian language, Italian culture, and history of art. The program provides a unique urban and architectural experience drawing from the rich past of the city for sources of instruction and inspiration.

Overlap Program

For qualified students the department offers an option that combines the fifth year of the undergraduate program with the first year of the Master of Architecture program. In the fall of the fourth undergraduate year interested students petition the department to substitute Arch 601–602 or 603–604 for Arch 501–502. At the same time, they complete graduate school applications and submit them with fee and portfolio to the graduate field secretary for architecture. Students accepted into the program may not normally begin until the fall of their fifth year and, once enrolled, may not transfer back into the 501–502 sequence.

Following admission into the Overlap Program, students may petition to apply toward the requirements of the master's degree a maximum of 30 credits, including Arch 601–602 or 603–604 and other advanced courses taken in excess of distribution requirements for the Bachelor of Architecture degree.

Curriculum

First Year

Fall Term	*Credits*
101 Design I	6
181 History of Architecture I	3
151 Drawing I	2
Math 111 Calculus or out-of-college elective	3–4
Out-of-college elective	3
	17–18

Spring Term	
102 Design II	6
182 History of Architecture II	3
152 Drawing II	2
Math 111 or out-of-college elective	3–4
Out-of-college elective (freshman writing seminar suggested)	3
	17–18

Second Year

Fall Term	*Credits*
201 Design III	6
263 Structural Concepts	4
231 Architectural Analysis I	2
261 Site Planning	3
Out-of-college elective	3
	18

Spring Term

202 Design IV	6
232 Architectural Analysis II	2
262 Building Technology, Materials, and Methods	3
264 Structural Systems I	3
College elective	3
	17

Third Year

Fall Term

301 Design V	6
361 Environmental Controls I—Lighting and Acoustics	3
363 Structural Systems II	3
Departmental elective	3
Out-of-college elective	3
	18

Spring Term

302 Design VI	6
342 Architecture as a Cultural System	3
362 Environmental Controls II—Mechanical and Passive Solar Systems	3
Departmental elective	3
College or out-of-college elective	3
	18

Fourth Year

Fall Term

401 Design VII	6
411 or 412 Professional Practice or Seminar	3
Departmental elective	3
College elective	3
Out-of-college elective	3
	18

Spring Term

402 Design VIII	6
Departmental elective	3
Departmental elective	3
College or out-of-college elective	3
Out-of-college elective	3
	18

Fifth Year

Fall Term	*Credits*
501 Design IX or 601 or 603 Overlap Program	6
Departmental elective	3
College or out-of-college elective	3
Out-of-college elective	3
Out-of-college elective	3
	18

Spring Term

502 Design X or 602 or 604 Overlap Program	8
Departmental elective	3
College or out-of-college elective	3
College or out-of-college elective	3
	17

Required Departmental Courses

Terms	*Subject*	*Course Numbers*	*Credits*
10	design	101–504	62
1	mathematics	Math 111 or approved equivalent	4
3	structures	263, 264, 363	10
4	technology	261, 262, 361, 362	12
2	architectural theory	231, 232	4
2	history of architecture	181, 182	6
1	architecture, culture and society	342	3
1	professional practice or seminar	411 or 412	3
2	drawing	151, 152	4
			108

Electives

Departmental

Terms		*Credits*
3	history of architecture: 300-level	9
1	visual studies or computer graphics	3
2	architectural theory	6
1	architectural science and technology	3
		21

College

Terms		*Credits*
2	art: any courses	6

Out-of-College

Terms	*Credits*	
1	computer programming	3
1	freshman writing seminar	3
1	mathematics, physics, or biological sciences	3
1	humanities	3
		12

Free

Of the electives, 15 credits are to be taken outside the College of Architecture, Art, and Planning, and 15 credits may be taken either in or outside the college.	30
Total credits	177

Transfer Students

Although the program leading to the Bachelor of Architecture is specifically directed to those who are strongly motivated to begin professional study when entering college, it is sufficiently flexible to allow transfers for students who have not made this decision until after they have been in another program for one or two years. Individuals who have already completed a nonprofessional undergraduate degree must also apply to transfer to the Bachelor of Architecture degree program, since the graduate program in architecture requires the Bachelor of Architecture degree or its equivalent for entrance.

Transfer students are responsible for completing that portion of the curriculum that has not been covered by equivalent work. Applicants who have had no previous work in architectural design must complete the ten-term design sequence. Since this sequence may be accelerated by attending summer terms, seven or eight regular terms and two or three summer terms are typically required.

For those who would benefit from an opportunity to explore the field of architecture before deciding on a commitment to professional education, the department offers an introductory summer program that includes an introductory studio in architectural design, lectures, and other experiences designed to acquaint the participants with opportunities, issues, and methods in the field of architecture.

Admission is offered to a limited number of transfer applicants who have completed a portion of their architecture studies in other schools. Each applicant's case is considered individually. Transfer students must complete a minimum of 70 credits and four terms in residence, taking 35 of the 70 credits (including four terms of design) in the Department of Architecture. Placement in the design sequence is based on a review of a representative portfolio of previous work.

Alternative Programs

Bachelor of Fine Arts

After completing the first four years of requirements, the student may choose to receive the degree of Bachelor of Fine Arts (B.F.A.) in architecture, which is not a professional degree.

Bachelor of Science in History of Architecture

The history of architecture major leads to a Bachelor of Science degree, conferred by the College of Architecture, Art, and Planning. The major is intended for transfer students from other programs at Cornell and from colleges and universities outside Cornell. Students in the Department of Architecture and the College of Arts and Sciences may take the major as part of a dual-degree program. The course of study in this major, available to students from a variety of academic backgrounds, offers the opportunity for a vigorous exploration of architecture and its history.

Admission requirements. Two years of undergraduate study; Arch 181 and 182, or the equivalent; and one 6-credit studio in architecture (or Arch 103, which is available during the fall semester for students with no previous studio work) are required. Students transferring from a B.Arch. program must be in good standing in their design sequence.

Procedure. Students from Cornell may transfer to the program at the beginning of the fall term of their third or fourth year of study. They submit a short application as prospective internal transfer students. It is required that, before applying, all prospective internal transfer students meet with a history of architecture faculty member to discuss procedural matters and program content.

Students who wish to transfer to the program from outside Cornell must apply to the Department of Architecture by March 15. Applications may be considered after this date but are given lower priority. Applications for both internal and external transfer students are

available from Elizabeth Cutter, Admissions Office, College of Architecture, Art, and Planning, Cornell University, 135 East Sibley Hall, Ithaca, New York 14853–6701.

Curriculum. A student entering the program is assigned an adviser from the history of architecture faculty in the Department of Architecture. Adviser and student together prepare an appropriate two-year course of study according to the following guidelines:

1) 24 credits of 300-level courses in architectural history: Arch 381, 382, 384, 385, 387, 388, 390, 391
2) 12 credits in 600-level architectural history seminars: Arch 681 through Arch 699; or 8 credits in a 600-level seminar plus Arch 499, offered for honors candidates only
3) One 300-, 400-, or 600-level course in architectural theory
4) 24 credits in electives selected in consultation with the student's adviser
5) Language requirement, to be met in the manner specified for students enrolled in the College of Arts and Sciences

Honors program. Students will graduate with honors if, during their two years of study in the program, they have a cumulative average of B or better in all courses, have no grade lower than A– in all history of architecture courses taken at the 300 level, and have completed an honors thesis (Arch 499) deemed to be of distinguished quality by the history of architecture faculty.

Dual Degree Options

Students can earn both the B.S. and B.Arch. degrees either simultaneously or sequentially. Students who have transferred into the B.Arch. program at Cornell may find this to be a special opportunity for an enlarged and enriched program of study. Ordinarily this option requires five years of study and assumes the satisfactory fulfillment of requirements in both the B.S. and B.Arch. programs.

Students currently enrolled in the College of Arts and Sciences at Cornell can earn a B.A. in an arts college major and a B.S. in the history of architecture in five years. In this option, students complete a minimum of 150 credits, which includes the B.S. prerequisites and curriculum requirements and 100 credits of the usual distribution and major requirements in the College of Arts and Sciences. Further information about this option is available at the Admissions Office, 135 East Sibley Hall, and at the Academic Advising Center of the College of Arts and Sciences, 55 Goldwin Smith Hall.

Students may also elect to continue toward a Master of Arts degree in the history of architecture. The M.A. ordinarily requires a minimum of two years of graduate work beyond the bachelor's degree; with this special sequential degree arrangement that time is shortened to one year.

Summer Term in Architecture

The summer term offers students the opportunity of a concentrated period of design work. Design is offered at both undergraduate and graduate levels; the term is six to eight weeks in duration.

Undergraduate design sequence courses, including thesis, are offered at first- through fifth-year levels in Ithaca. Normally there is also a design program abroad for third-, fourth-, and fifth-year students.

Students from schools of architecture other than Cornell are welcome to apply to the college for admission to any summer programs.

At the graduate level the summer term is devoted to problems forming part of the student's program of work. The term may carry residence credit equal to that of a normal academic term. Participation in the program cannot be undertaken without the consent of the student's Special Committee.

Architectural Design

Courses in brackets are not offered this year.

A studio fee of $65 is charged each semester for every design course (these fees are subject to change).

Sequence Courses

ARCH 101 Design I
Fall. 6 credits. Limited to department students.
Studios and lecs, M W F 2–6. Staff.
An introduction to design as a conceptual discipline directed at the analysis, interpretation, synthesis, and transformation of the physical environment. Exercises are aimed at developing an understanding of the issues, elements, and processes of environmental design.

ARCH 102 Design II
Spring. 6 credits. Limited to department students. A continuation of Architecture 101.
Studios and lecs, M W F 2–6. Staff.
Human, social, technical, and aesthetic factors related to space and form. Design problems range from those of the immediate environment of the individual to that of small social groups.

ARCH 201–202 Design III and IV
Fall and spring. 6 credits each term. Coregistration in Architecture 231–232 and completion of Architecture 151–152 required. Limited to department students.
Studios and sems, M W F 2–6. Staff.

ARCH 301–302 Design V and VI
Fall and spring. 6 credits each term. Limited to department students.
Studios and sems, M W F 2–6. Staff.

ARCH 401–402 Design VII and VIII
Fall and spring. 6 credits each term. Limited to department students.
Studios and sems, M W F 2–6. Staff.
Programs in architectural design, urban design, or architectural technology and environmental science, etc.

ARCH 501 Design IX
Fall or spring. 6 credits. Limited to department students.
Studios and sems, M W F 2–6. Staff.
Programs in architectural design, building typology investigations, and research leading to complete development of the student's thesis program. General instruction in the definition, programming, and development of a thesis is followed by tutorial work with the student's advisory committee.

ARCH 502 Design X—Thesis
Fall or spring. 8 credits. Prerequisite: Architecture 501. Required of B.Arch. candidates who must satisfactorily complete a thesis. Students accepted for admission to the Overlap Program are exempt from the thesis requirement.
Studios, M W F 2–6. Staff.

ARCH 601–602 Special Program in Architectural Design
Fall and spring. 9 credits each term. Limited to students who have been accepted into the Overlap Program. Registration by petition only.

ARCH 603–604 Special Program in Urban Design
Fall and spring. 9 credits each term. Limited to students who have been accepted into the Overlap Program. Registration by petition only.

Graduate Courses

ARCH 701–702 Problems in Architectural Design
Fall and spring. 9 credits each term.
Studio and sem, hours to be arranged. Staff.
Basic first-year design course for graduate students whose major concentration is architectural design.

ARCH 703–704 Problems in Urban Design
Fall and spring. 9 credits each term.
Studio and sem, hours to be arranged. Staff.
Basic first-year design course for graduate students whose major concentration is urban design.

ARCH 801 Thesis or Research in Architectural Design
Fall or spring. 9 credits.
Hours to be arranged. Staff.
Second-year design course for graduate students whose major concentration is architectural design.

ARCH 802 Thesis or Research in Urban Design
Fall or spring. 9 credits.
Hours to be arranged. Staff.
Second-year design course for graduate students whose major concentration is regional design.

Elective Design Courses

ARCH 103–104 Elective Design Studio
103, fall; 104, spring. 6 credits each term. Limited to students from outside the department. Prerequisite: permission of instructor.
M W F 2–6. Staff.

ARCH 303 Special Problems in Architectural Design
Fall or spring. Variable credit (maximum, 3). Prerequisite: permission of instructor and approved independent study form.
Hours to be arranged. Staff.
Independent study.

ARCH 200, 300, 400, 500 Elective Design
Fall or spring. 6 credits each term. Open by permission to transfer students who have not been assigned to a sequence course. Prerequisite: permission of department office. Each student is assigned to a class of appropriate level.
M W F 2–6. Staff.

ARCH 605 Special Problems in Design
Fall and spring. Variable credit (maximum 3). Prerequisite: permission of instructor.
Hours to be arranged. Staff.
Independent study.

Related Courses and Seminars

ARCH 317 (367) Contemporary Italian Culture
Fall or spring. Variable credit (maximum, 3). For students in the Rome program only.
Staff and visiting faculty.
This course provides a broad view of the culture and social structure of Italy, drawing from Italian literature, history, and current events.

ARCH 411 (461) Professional Practice
Fall or spring. 3 credits each term.
T 1:25–4:25. M. Schack and staff.
An examination of organizational and management theories and practices for delivering professional design services. Included is a historic overview of the profession and a review of the architect's responsibilities from the precontract phase through construction. Application of computer technology in preparing specifications.

[ARCH 412 (462) Professional Seminar
Fall or spring. 3 credits. Washington Program only.]

ARCH 510 Thesis Introduction
Foreign summer programs and Rome program only. 3 credits. Must be taken in conjunction with Architecture 500. Architecture 500 will be considered equivalent to Architecture 501 when taken concurrently with Architecture 510 during a foreign summer program or in Rome.
Lecs and sems. Staff.
Lectures, seminars, and independent research leading to complete development of the student's thesis program. General instruction in the definition, programming, and development of a thesis.

ARCH 611–612 Urban Housing Developments
611, fall; 612, spring. 3 credits each term. Limited to fourth- and fifth-year students in architecture and graduate students. Prerequisite: permission of instructor. Not offered every year.
Staff.

ARCH 613 Transportation
Fall. 3 credits. Prerequisite: permission of instructor. Not offered every year.
Sem, hours to be arranged. Staff.
The impact of various transportation forms on the environment is considered from the perspectives of architects, engineers, planners, and human ecologists. Readings and discussions of past, current, and future transportation modes focus on aesthetic and physical aspects.

ARCH 614 Low-Cost Housing
Fall. 3 credits. Prerequisite: permission of instructor. Not offered every year.
T 2–4:30. H. W. Richardson.
Aspects of low-cost housing involving engineering technology, architecture, physical planning, economics, and sociology.

ARCH 618–619 Seminar in Urban and Regional Design
618, fall; 619, spring. 3 credits each term. Limited to fifth-year and graduate students. Not offered every year.
Hours to be arranged. Staff and guest lecturers.
A broad range of issues and problems of urban and regional development and the context in which the designer functions are surveyed. Selected case studies are presented by the participants and visitors.

Architectural Theory

ARCH 131 An Introduction to Architecture
Fall, spring, or summer. 3 credits. Open to out-of-department students only. Architecture 131 is not a prerequisite for Architecture 132.
Lecs T R 1:25–2:15. Disc to be arranged.
Staff, guest lecturers.
Intended to familiarize non-architecture students with the art and science of architecture. Fundamentals of plan, section, and elevation, the primary elements that comprise an architectural form; basic organizational principles; the ways in which we perceive architectural space; and the various concepts of function in relation to form will be included among the topics to be covered, using examples from numerous times and cultures as well as from the contemporary Cornell campus.

ARCH 132 An Introduction to Architecture
Spring. 3 credits. Open to out-of-department students only. Architecture 131 is not a prerequisite for Architecture 132.
Lecs T R 1:25–2:15. Disc to be arranged.
Staff, guest lecturers.
Non-architecture students are initiated into various types of architectural drawings and exposed to a variety of methods whereby architectural forms communicate both simple and complex meanings. Architecture in its relation to fields such as landscape architecture, urban design, structural design, interior design, set design, architectural history, preservation, and computer graphics will be included in the presentations, which will also deal with the various relationships established between an architect and a society. Cross-historical and cross-cultural examples will be used in developing in the student a degree of fluency in the languages of architectural discourse.

ARCH 231 Architectural Analysis I
Fall. 2 credits. Architecture students must register concurrently in Architecture 201.
Studios and lecs, T 1:25–3:20. Staff.
An introduction to analysis of the object of study in the interest of broadening one's understandings of the ways in which architecture can connote and denote meanings.

ARCH 232 Architectural Analysis II
Spring. 2 credits. Architecture students must register for this course concurrently with Architecture 202.
Studios and lecs, T 1:25–3:20. Staff.
Advanced analytical studies focusing on complex architectural spaces, objects, images, and representations.

ARCH 335 Theory of Architecture
Fall or spring. 3 credits. Prerequisite: Architecture 231–232 or permission of instructor. Not offered every year.
Lecs, T R 4:40–6:30. L. F. Hodgden.

ARCH 336 Theory of Architecture
Fall or spring. 3 credits. Limited to third-year students and above. Not offered every year.
Lecs, T R 4:40–6:30. L. F. Hodgden.
Theories of modern architecture: De Stijl, cubist and purist painting, industrialized architecture, Le Corbusier's architecture and urban theories, architectural sequence, facades, the free plan, "DOM-INO" theory.

ARCH 337 Special Investigations in the Theory of Architecture I
Fall or spring. Variable credit (maximum, 3). Prerequisite: permission of instructor and approved independent study form.
Hours to be arranged. Staff.
Independent study.

ARCH 338 Special Topics in the Theory of Architecture I
Fall or spring. 3 credits. Prerequisite: permission of instructor. Not offered every year.
Hours to be arranged. V. Warke and visiting faculty.
Topic to be announced before preregistration.

ARCH 431 Theory of Architecture
Fall. 3 credits. Prerequisite: third-year status. Not offered every year.
Lecs, T R 4:40–6:30. L. F. Hodgden.
Gardening and architecture: urban parks; villas and country houses; and Italian, French, and English landscape gardens. Site planning.

ARCH 432 Theory of Architecture
Spring. 3 credits. Prerequisite: third-year status. Not offered every year.
Lecs, T R 4:40–6:30. L. F. Hodgden.
The development of urban form, urban intervention, contextualism, ideal cities, historic new towns, streets, piazzas, fortifications, public buildings and social housing types, site planning, and transportation.

ARCH 435 Architecture and Representation
Fall. 3 credits. Limited to degree candidates in architecture. Prerequisite: successful completion of Architecture 231–232. Not offered every year.
Lecs, disc, and reviews, T R 2:30–4:30. V. Warke.
A study of architecture as it functions as a representational art, referring to its past while inferring its present.

ARCH 635 Critical Theory in Architecture
Spring. 3 credits. Prerequisite: permission of instructor. Not offered every year.
Sem, hours to be arranged. V. Warke.
An inquiry into the fundamental principles of architectural criticism in theory and practice, with emphasis on the structures of criticism in the twentieth century.

ARCH 637 Special Investigations in the Theory of Architecture II
Fall or spring. Variable credit (maximum, 4). Prerequisite: permission of instructor and approved independent study form.
Hours to be arranged. Staff.
Independent study.

ARCH 638 Special Topics in the Theory of Architecture II
Fall or spring. 3 credits. Prerequisite: permission of instructor. Not offered every year.
Hours to be arranged. Staff.
Topic to be announced before preregistration.

ARCH 639 Principles of Design Process
Fall or spring. 3 credits. Limited to third-year architecture students and above; students in other colleges must have permission of instructor. Not offered every year.
Sems, M W 10:10–12:05. A. Mackenzie.
Analysis of the major theories and techniques of design developed during the past fifteen years, with special emphasis on application to the solution of whole problems in architectural design.

Architecture, Culture, and Society

ARCH 342 Architecture as a Cultural System
Spring. 3 credits. Architecture 445, 446, 447, or 448 can substitute with permission of instructor.
M W F 10:10–11:00. B. MacDougall.
What have been the major issues in the theory and practice of architectural design through time and across cultures, and how is aesthetic judgment related to more general systems of ordering within a particular society or group? This course draws on concepts, methods, and findings from the broad field of cultural anthropology to address these questions. Case studies and examples are drawn from a wide range of architectural traditions around the world for which there is a significant ethnographic literature, with special emphasis on sub-Saharan Africa, India, and the United States. Topics include the ideational and formal relationships between folk and monumental traditions in complex societies, the structure of the ideal social order and its refraction in the material world, cosmological models and architectural form, geometries of non-Western traditions, and the relationship between indigenization and culture change.

ARCH 349 Undergraduate Investigations in Architecture, Culture, and Society
Fall or spring. Variable credit (maximum 3). Prerequisite: permission of instructor and approved independent study form.
Hours to be arranged. B. MacDougall.
Independent study.

ARCH 441–442 Special Topics in Architecture, Culture, and Society
Fall and spring. 3 credits each term. Prerequisite: permission of instructor.
Hours to be arranged. Topic to be announced. B. MacDougall.
Topic to be announced before preregistration.

ARCH 445 Architecture and the Mythic Imagination
Fall. 3 credits. Prerequisite: Architecture 342 or permission of instructor.
M W F 10:10–11:00. B. MacDougall.
This course focuses on traditional societies in which beliefs about architectural order are borne out of the mythic and religious imagination. Certain themes that are common to a range of cultures are explored in detail. They include the model of the human body as a source of architectural knowledge, the sacred center, the cosmic mountain, and architectural rituals as enactments of myths. Such themes are traced across cultures, through time and into contemporary theory.

ARCH 446 Topics in Architecture, Culture, and Society
Fall or spring. 3 credits. Prerequisite: Architecture 342 or permission of instructor.
Hours to be announced.
B. MacDougall.

ARCH 447 Architectural Design and the Utopian Tradition
Fall. 3 credits. Prerequisite: Architecture 342 or permission of instructor.
R 2:30–4:30. B. MacDougall.
This course explores the relationship between visionary architecture of the late 19th and 20th centuries and the wider utopian literature of the time. It first explores themes in utopian fiction as well as in anti-utopian tracts and then turns to the attempts of architects, planners, and artists to concretize visions of the ideal world. The course will devote special attention to the ways in which ideals grounded in the utopian tradition have emerged in the social criticism of housing and neighborhood design in the urban setting in recent times.

ARCH 448 The Indian Example and the Visual Tradition in Culture
Spring. 3 credits. Prerequisite: Architecture 342 or permission of instructor.
T R 2:30–4:30. B. MacDougall.
This course provides a concise chronological summary of the major building traditions of Hindu India and explores the relationship between form and more general beliefs about the power of vision to reveal and transform. Topics include the sculptural program of the Hindu temple as a vehicle for the preservation and transmission of mythic texts, the oculus as an element and the eye as a motif, darshan, the spiritually transforming vision, and the destructive power of vision as revealed in myth and beliefs about "evil eye."

ARCH 647–648 (667–668) Architecture in Its Cultural Context I and II
647, fall; 648, spring. 4 credits each term. Prerequisite: permission of instructor. Not offered every year.
Sem, M W F 10:10. B. MacDougall.
Fall term, theory; spring term, problem solving and method. An examination of the relationship between architecture and other aspects of culture. Emphasis on the motivations for particular architectural forms and especially on theories of architecture. Examples from the United States and Asia.

ARCH 649 Graduate Investigations in Architecture, Culture, and Society
Fall or spring. Variable credit (maximum 4). Prerequisite: permission of instructor and approved independent study form.
Hours to be arranged. B. MacDougall.
Independent study.

Visual Studies

Darkroom fees for all photography courses.

ARCH 151 Drawing I
Fall. 2 credits.
Studios, T R 2:30–4:25. Staff.
Freehand drawing with emphasis on line and perspective representation of form and space.

ARCH 152 Drawing II
Spring. 2 credits. Prerequisite: Architecture 151.
Studios, T R 2:30–4:25. Staff.
Freehand drawing as a means of conceiving and expressing spatial form; line weight, shades and shadows, and figure drawing.

ARCH 251 Introductory Photo I (also Art 161)
Fall or spring. 3 credits each term.
Hours to be arranged. Art staff.
For description see Art 161.

ARCH 351 Introductory Photo II (also Art 261)
Spring. 3 credits. Prerequisites: Architecture 251 or Art 161, or permission of instructor.
Hours to be arranged. Art staff.
For description see Art 261.

ARCH 356 Architectural Simulation Techniques
Fall or spring. 3 credits. Prerequisite: Architecture 151 or permission of instructor. Not offered every year.
Lec and studio, hours to be arranged.
G. Hascup.
Two- and three-dimensional simulation techniques in architecture. Emphasis on simulation of environment, space, materials, and lighting as visual tools for architectural design.

ARCH 450 Architectural Publications
Fall and spring. Variable credit (maximum 3). May be repeated for credit.
Lecture and studio, hours to be arranged.
Staff.
Colloquy and practicum on issues related to the production of an architectural journal, as well as other theoretical and practical production related to the exchange of architectural ideas. Exercises will cover both theoretical as well as hands-on aspects of architectural publication.

ARCH 457 Special Project in Photography
Fall or spring. Variable credit (maximum, 3). Prerequisites: written proposal outlining the special project and permission of instructor. Not offered every year.
Hours to be arranged. Staff.
Independent study.

ARCH 458 Special Investigations in Visual Studies
Fall or spring. Variable credit (maximum, 3). Prerequisites: permission of instructor and approved independent study form.
Hours to be arranged. Staff.
Independent study.

ARCH 459 Special Topics in Visual Studies I
Fall or spring. 3 credits. Prerequisite: permission of instructor.
Hours to be arranged. Staff.
Topics to be announced before preregistration.

ARCH 658 Special Investigations in Visual Studies II
Fall or spring. Variable credit (maximum 4). Prerequisites: permission of instructor and approved independent study form.
Hours to be arranged. Staff.
Independent study.

ARCH 659 Special Topics in Visual Studies II
Fall or spring. 3 credits. Prerequisite: permission of instructor.
Hours to be arranged. Staff.
Topic to be announced before preregistration.

Architectural Science and Technology

Structures

ARCH 263 (122) Structural Concepts
Fall. 4 credits. Prerequisite: Mathematics 111 or approved equivalent.
Lecs and sems, T R 9:05–11. Staff.
Fundamental concepts of structural behavior. Statics and strength of materials.

ARCH 264 (221) Structural Systems I
Spring. 3 credits. Prerequisites: Mathematics 111 and Architecture 263.
Lecs and sems, T R 9:05–11. Staff.
Structural design concepts and procedures for steel and timber building construction.

[ARCH 363 (222) Structural Systems II
Fall. 3 credits. Prerequisite: Mathematics 111 and Architecture 263.
Lec and sems, M W F 11:15–12:05. Staff.
Structural design concepts and procedures for reinforced concrete building construction.]

ARCH 463 Special Topics in Structures
Fall or spring. 3 credits. Limited to 30 students. Prerequisites: Architecture 263, 264, and 363 or permission of instructor. Not offered every year.
Hours to be arranged. Staff.
Topic to be announced by preregistration.

ARCH 473 Special Investigations in Structures
Fall or spring. Variable credit (maximum 3). Prerequisite: permission of instructor and approved independent study form.
Hours to be arranged. Staff.
Independent study.

Construction

ARCH 160 The History of Architectural Technology
Fall or spring. 3 credits. Not for students in the Department of Architecture. Not offered every year.
Staff.
Architectural technology is a seemingly illogical blend of scientific knowledge and empirical experience. Whereas it may seem chaotic to the nonprofessional, it is a product of logic in the widely differing areas of design, structure, installation, production and erection, material use, law, economics, and historical development. The evolution of this interdependence is treated using examples of architectural and civic engineering works and processes.

ARCH 262 Building Technology, Materials, and Methods
Spring. 3 credits.
Lecs, M W F 12:20–1:10. J. Ochshorn.
Properties of materials—their use and application to the design of buildings and building systems. Discussion of various methods of building construction and assembly.

ARCH 465 Special Topics in Construction
Fall or spring. 3 credits. Limited to 30 students. Prerequisites: Architecture 262 or permission of instructor. Not offered every year.
Hours to be arranged. Staff.
Topic to be announced by preregistration.

ARCH 475 Special Investigations in Construction
Fall or spring. Variable credit (maximum 3). Prerequisite: permission of instructor and approved independent study form.
Hours to be arranged. Staff.
Independent study.

Environmental Controls

ARCH 261 Environmental Controls—Site Planning
Fall. 3 credits.
Lecs, M W F 11:15–12:05. J. Ochshorn.
The basic principles involved in design in the outdoor environment. A brief historical perspective. A development of inventory including grading and drainage. Foundations, surfacing, and construction.

ARCH 361 Environmental Controls—Lighting and Acoustics
Fall. 3 credits.
Lecs, T R 11:15–1:10. R. Hall and staff.
Basic properties and principles of sound and light. Sound phenomena, noise control, absorption, acoustical design. Light, color, and form. Natural lighting possibilities and constraints. Good and bad examples of artificial lighting.

ARCH 362 Environmental Controls—Mechanical and Passive Solar Systems
Spring. 3 credits.
Lecs, T R 11:15–1:10.
S. Thiratrakoolchai.
Basic thermal analysis of buildings, human comfort criteria, energy conservation, passive solar design, HVAC distribution systems, overview of mechanical conveying systems and plumbing.

ARCH 464 Special Topics in Environmental Controls
Fall or spring. 3 credits. Limited to 30 students. Prerequisites: Architecture 261, 361, and 362 or permission of instructor. Not offered every year.
Hours to be arranged. Staff.
Topic to be announced by preregistration.

ARCH 474 Special Investigations in Environmental Controls
Fall or spring. Variable credit (maximum 3). Prerequisite: permission of instructor and approved independent study form.
Hours to be arranged. Staff.
Independent study.

Computer Applications

ARCH 374 Computer Graphics (also Computer Science 417)
Spring. 3 credits. Prerequisites: two terms of calculus and Computer Science 211, or equivalent. Not offered every year.
2 lecs, 1 lab. D. P. Greenberg.
Introduction to the principles of interactive computer graphics, including input techniques, display devices, display files, interactive graphic techniques, two- and three-dimensional computer graphics, perspective transformations, hidden line and hidden surface algorithms, and color-picture generation.

ARCH 375 Practicum in Computer Graphics (also Computer Science 418)
Spring. 2 credits. Prerequisite: Computer Science 211. Recommended: Computer Science 314. Corequisite: Architecture 374. Not offered every year.
1 lab.
Two or three programming assignments dealing with sophisticated interactive vector graphics programs on calligraphic displays and solid-image generation on raster graphics displays.

ARCH 378 Computers in Architecture Seminar
Fall or spring. 3 credits. Prerequisites: Computer Science 100 or permission of instructor. Not offered every year.
Hours to be arranged. H. Richardson and staff.
Exploration of the use of computers in a variety of ways encompassing architectural practice and education. Use of the computer is not required for this course.

ARCH 379 Design by Computer
Spring. 3 credits. Prerequisites: Limited to third-year students and above. Not offered every year.
Hours to be arranged. R. Hall.
Exploration of the formalization of the design process for compatability with the computer, and the role of computers in design. Lecture with CAD lab.

ARCH 476 Special Topics in Computer Applications
Fall or spring. 3 credits. Limited to 30 students. Prerequisites: Architecture 374 or 379 or permission of instructor. Not offered every year.
Hours to be arranged. Staff.
Topic to be announced by preregistration.

ARCH 477–478 Special Projects in Computer Graphics
477, fall; 478, spring. Variable credit (maximum, 4). Limited to third-year students and above. Prerequisites: Architecture 374 plus concurrent registration in Computer Science 314 or equivalent, and permission of instructor.
Hours to be arranged. D. P. Greenberg and staff.
Advanced work in computer graphics input and display techniques, including storage tube, dynamic vector and color raster displays.

Graduate Courses

ARCH 761–762 Architectural Science Laboratory
761, fall; 762, spring. 6 credits each term. Open to architectural science graduate students only.
Hours to be arranged. Staff.
Projects, exercises, and research in the architectural sciences.

ARCH 763–764 Thesis or Research in Architectural Science
763, fall; 764, spring. Variable credit (maximum, 12). Limited to architectural science graduate students.
Hours to be arranged.
Independent study.

Architectural History

The history of the built domain is an integral part of all aspects of the architecture curriculum, from design and theory to science and technology. Incoming students take Architecture 181–182 in the first year, and three additional courses from the 380–390 series, preferably in the third and fourth years. Seminars are intended for advanced undergraduate and graduate students and do not satisfy undergraduate history requirements. Courses, seminars, and special investigations focus on the Western tradition, which constitutes the most immediate setting for contemporary practice. Building cultures from other parts of the world, often more extensive and far older than those of the West, are studied in special offerings as opportunities and faculty resources become available.

Sequence Courses

ARCH 181 History of Architecture I
Fall. 3 credits. Required of all first-year students in architecture; open to all students in other colleges with an interest in the history of the built domain.
T R 11:15–1:10. Staff.
The history of the built environment as social and cultural expression from the earliest to most recent times. Themes, theories, and ideas in architecture and urban design are considered on the basis of selected instances beginning with the earliest written records.

ARCH 182 History of Architecture II
Spring. 3 credits. Required of all first-year students in architecture. Open to all students in other colleges with an interest in the history of the built domain; may be taken independently of Architecture 181.

T R 11:15–1:10. Staff.

The history of the built environment as social and cultural expression from more recent times to the present. Themes, theories, and ideas are addressed in greater detail for architecture and urban design leading to the present.

Freshman Writing Seminars

ARCH 190 The Language of Architecture
Fall or spring. 3 credits. Not for students in the Department of Architecture. Not offered every year.

Hours to be arranged. Staff.

The metaphor of language is used to discuss works of architecture both as formal objects and as carriers of meaning when seen in their cultural contexts. Contemporary and historical examples, including local buildings, are examined to develop skills in visual analysis and in "reading the messages" in architectural design.

ARCH 191 The Literature of Architecture
Fall or spring. 3 credits. Not for students in the Department of Architecture. Not offered every year.

Hours to be arranged. Staff.

The literature of architecture, understood as the testimony of the architects themselves, is drawn on to examine major themes of twentieth-century architecture. Texts are presented according to rhetorical mode within a framework of thematic categories. For example, narrative, descriptive, and polemical readings address the birth of the skyscraper. Three salient themes in modern architecture are explored in the seminar: the impact of technology and revolution, the skyscraper and dwelling as new types for new needs, and the aesthetic of modern architecture.

ARCH 192 Visions of the City
Fall or spring. 3 credits. Not for students in the Department of Architecture. Freshman Seminar. Not offered every year.

Staff.

Visions of the City explores the history and nature of the American city through the works of writers, poets, artists and designers. Three thematic categories provide a framework for class discussion and writing assignments. "The Industrial City" considers the social, political, and physical environment shaped by the forces of industrialization and increasing urban populations in late nineteenth-century America. "The City Beautiful" focuses on journalistic accounts and technical reports by professionals advocating physical planning as a cure for the social and aesthetic problems of the rapidly expanding metropolis. "The Modern City" addresses the disparate elements of the contemporary city, from the sprawl of suburbia to the large urban complexes such as Rockefeller Center, which are "cities within cities." Students will also consider comprehensive city plans proposed by prominent modern architects such as Frank Lloyd Wright and Le Corbusier. Students will be encouraged to draw on their own experiences and impressions of the city and to consider the relevance of historical problems and solutions to contemporary urban situations.

Directed Electives

ARCH 381 Architecture of the Classical World
Spring. 3 credits. Limited to 30 students. Prerequisites: Architecture 181–182 or permission of instructor. Not offered every year.

Hours to be announced. M. Jarzombek.

The history of architecture and urban design in ancient Mediterranean civilizations, with emphasis on Greece and Rome. The course considers change and transformation of building types and their elements within the general context of social demands.

ARCH 382 Architecture of the Middle Ages
Fall. 4 credits. (Credit for this course may be obtained by taking History of Art 332.) Prerequisites: Architecture 181–182 or permission of instructor. Not offered every year.

Hours to be announced. R. G. Calkins.

A survey of medieval architecture from the Early Christian period to the late Gothic (A.D. 300–1500). Emphasis is given to the development of structural systems, form, function, and meaning of important medieval buildings.

ARCH 384 The Renaissance
Fall. 3 credits. Limited to 30 students. Prerequisites: Architecture 181–182 or permission of instructor.

Hours to be announced. M. Jarzombek.

History of European architecture and city planning of the fifteenth and sixteenth centuries. Special consideration is given to building types and to internal changes in architecture and urban design, as well as to external influences such as social, economic, and political factors.

ARCH 385 The Baroque
3 credits. Limited to 30 students. Prerequisites: Architecture 181–182 or permission of instructor. Not offered every year.

Hours to be announced. C. F. Otto.

History, ideas, and theories of architecture and urban design in Europe between 1600 and 1800. Special consideration is given to the contribution and significance of major architects of the time.

[ARCH 386 English Architecture: 1688–1892
Fall. 3 credits. Prerequisites: Architecture 181–182 or permission of instructor. Not offered every year.]

ARCH 387 The Nineteenth Century
Spring. 3 credits. Limited to 30 students. Prerequisites: Architecture 181–182 or permission of instructor. Not offered every year.

Hours to be announced. M. Woods.

Examination of the significant individuals and movements in Western architectural theory and practice from the rationalist traditions through art nouveau.

ARCH 388 The Twentieth Century
Fall. 3 credits. Limited to 30 students. Prerequisites: Architecture 181–182 or permission of instructor. Not offered every year.

Hours to be announced. C. F. Otto.

The history, ideas, and theories of architecture and urban design in Europe and America during the course of the twentieth century, beginning with reform efforts of the 1890s and concluding with work from the 1990s.

ARCH 390 American Architecture I
Fall. 3 credits. Limited to 30 students. Prerequisites: Architecture 181–182 or permission of instructor. Not offered every year.

Hours to be announced. M. Woods.

History of American architecture and urbanism from prehistoric times to the Civil War, with emphasis on stylistic trends, practitioners, and social, economic, and aesthetic issues.

ARCH 391 American Architecture II
Spring. 3 credits. Limited to 30 students. Prerequisites: Architecture 181–182 or permission of instructor. Not offered every year.

Hours to be announced. M. Woods.

A continuation of Architecture 390 but may be taken independently. The history of American architecture and urbanism from the Civil War to the 1980s. Special attention is paid to the dominant cultural, technical, and aesthetic determinants of form as manifested in the work of the major architects of the time.

ARCH 392 Modern Architecture On Film
Spring. 3 credits. Limited to 30 students. Prerequisites: Architecture 181–182 or permission of instructor. Not offered every year.

Hours to be announced. M. Woods.

An exploration of certain themes critical to modern architecture and urbanism through their representation in both popular and avant-garde films. Selected readings in modern architecture and film. Class discussion, presentations, and papers will be required.

ARCH 395 Special Topics in Architectural History
Spring. 3 credits. Limited to 30 students. Prerequisites: Architecture 181–182 or permission of instructor. Not offered every year.

Hours to be announced. M. Jarzombek.

Topic to be announced by preregistration.

[ARCH 396 Special Topics in Architectural History
Spring. 3 credits. Limited to 30 students. Prerequisites: Architecture 181–182 or permission of instructor. Not offered every year. Not offered 1992–93.]

ARCH 397 Special Topics in Architectural History
Spring. 3 credits. Limited to 30 students. Prerequisites: Architecture 181–182 or permission of instructor. Not offered every year.

Hours to be arranged. C. F. Otto.

Topic to be announced by preregistration.

ARCH 398 Special Topics in Architectural History
Spring. 3 credits. Limited to 30 students. Prerequisites: Architecture 181–182 or permission of instructor. Not offered every year.

Hours to be arranged. M. Woods.

Topic to be announced by preregistration.

ARCH 399 Special Topics in Architectural History
Fall or spring. 3 credits. Limited to 30 students. Prerequisites: Architecture 181–182 or permission of instructor. Not offered every year.

Hours to be arranged. Staff.

Topic to be announced by preregistration.

Courses in Preservation

ARCH 583 (543) Measured Drawing (also City and Regional Planning 567)
Fall. 3 credits. For undergraduate architecture students and graduate students in history and preservation. Prerequisite: permission of instructor.
Hours to be announced. M. A. Tomlan.
Combines study of architectural drawings as historical documents with exercises in preparing measured drawings of small buildings. Presents the basic techniques of studying, sketching, and measuring a building and the preparation of a finished drawing for publication.

ARCH 584 (544) Problems in Contemporary Preservation Practice (also City and Regional Planning 563)
Spring. Variable credit (maximum, 3).
Hours to be announced. M. A. Tomlan.
A review and critique of ongoing preservation projects and an investigation of areas of expertise currently being developed, presented by staff and guest lecturers.

ARCH 585 (545) Perspectives on Preservation (also City and Regional Planning 562)
Fall. 3 credits.
Hours to be announced. M. A. Tomlan and visiting lecturers.
Introductory course for preservation planning. The rationale for, and methods of, using existing cultural and aesthetic resources in the planning and design of regions and cities.

ARCH 586 (546) Documentation for Preservation Planning (also City and Regional Planning 560)]
Fall. 3 credits.
Hours to be announced. M. A. Tomlan and visiting lecturers.
Methods of collecting, recording, processing, and analyzing historical architectural and planning materials.

ARCH 587 (547) Building Materials Conservation (also City and Regional Planning 564)
Spring. 3 credits. Open to juniors, seniors, and graduate students.
Hours to be announced. M. A. Tomlan.
A survey of the development of building materials in the United States, chiefly during the nineteenth and early twentieth centuries, and a review of the measures that might be taken to conserve them.

ARCH 588 (548) Historic Preservation Planning Workshop: Surveys and Analyses (also City and Regional Planning 561)
Fall or spring. 4 credits.
Hours to be announced. Staff.
Techniques for the preparation of surveys of historic structures and districts; identification of American architectural styles, focusing on upstate New York; explorations of local historical resources, funding sources, and organizational structures. Lectures and training sessions. Emphasis on fieldwork with individuals and community organizations.

Seminars in Architectural History

ARCH 681 Seminar in the Architecture of the Classical World
Fall or spring. 4 credits. Prerequisites: Architecture 381 or permission of instructor. Not offered every year.
Hours to be arranged. M. Jarzombek.
Issues in Greek and Roman architectural history. Specific topic to be announced.

ARCH 684 Seminar in the Renaissance
Fall or spring. 4 credits. Prerequisites: Architecture 384 or permission of instructor. Not offered every year.
Hours to be arranged. M. Jarzombek.
Issues in European architecture and city planning of the fifteenth and sixteenth centuries. Specific topic to be announced.

ARCH 685 Seminar in the Baroque
Fall or spring. 4 credits. Prerequisites: Architecture 385 or permission of instructor. Not offered every year.
Hours to be arranged. C. F. Otto.
Special topics in the history of European architecture and urban design between 1600 and 1800. Specific topic to be announced.

ARCH 687 Seminar in Nineteenth-Century Architecture
Fall or spring. 4 credits. Prerequisites: Architecture 387 or permission of instructor. Not offered every year.
Hours to be arranged. M. Woods.
Historical topics in European architecture and urbanism in the nineteenth century. Specific topic to be announced.

ARCH 688 Seminar in Twentieth-Century Architecture
Fall or spring. 4 credits. Prerequisites: Architecture 388 or permission of instructor. Not offered every year.
Hours to be arranged. C. F. Otto.
Special topics in the history of architecture and urban design in Europe and America during the twentieth century. Specific topic to be announced.

ARCH 690 Seminar in American Architecture
Fall or spring. 4 credits. Prerequisites: Architecture 390–391 or permission of instructor. Not offered every year.
Hours to be arranged. M. Woods.
Historical topics in the architecture of the nineteenth and twentieth centuries in the United States. Specific topic to be announced.

ARCH 695 Seminar in the History of Architecture and Urbanism
Fall or spring. 4 credits. Prerequisite: permission of instructor. Not offered every year.
Hours to be announced. M. Jarzombek.
Topic to be announced.

[ARCH 696 Seminar in the History of Architecture and Urbanism
Fall or spring. 4 credits. Prerequisites: permission of instructor. Not offered every year. Not offered 1992–93.]

ARCH 697 Seminar in the History of Architecture and Urbanism
Fall or spring. 4 credits. Prerequisite: permission of instructor. Not offered every year.
Hours to be arranged. C. F. Otto.
Topic to be announced.

ARCH 698 Seminar in the History of Architecture and Urbanism
Fall or spring. 4 credits. Prerequisite: permission of instructor. Not offered every year.
Hours to be arranged. M. Woods.
Topic to be announced.

ARCH 699 Seminar in the History of Architecture and Urbanism
Fall or spring. 4 credits. Prerequisite: permission of instructor. Not offered every year.
Hours to be arranged. Staff.
Topic to be announced.

Independent Study, Thesis, Dissertation

ARCH 299 Undergraduate Independent Study in the History of Architecture
Fall or spring. Variable credit (maximum, 3). Prerequisite: permission of instructor. May not be taken by students in design to satisfy undergraduate history requirements.
Hours to be arranged. Staff.
Independent study for undergraduate students.

ARCH 499 Undergraduate Thesis in the History of Architecture
Fall or spring. 4 credits. For B.S. honors candidates in history only.
Hours to be arranged. Staff.

ARCH 799 Graduate Independent Study in the History of Architecture and Urbanism
Fall or spring. Variable credit. Prerequisite: permission of instructor.
Hours to be arranged. Staff.
Independent study for graduate students.

ARCH 899 M.A. Thesis in History of Architecture and Urbanism
Fall or spring. Variable credit.
Hours to be arranged. Staff.
Independent study for the master's degree.

ARCH 999 Ph.D. Dissertation in History of Architecture and Urbanism
Fall or spring. Variable credit.
Hours to be arranged. Staff.
Independent study for the doctoral degree.

ART

V. G. Kord, chair; R. Bertoia, Z. Blum, S. Bowman, N. D. Daly, J. N. Locey, E. Meyer, E. Mikus, G. Page, B. Perlus, S. Poleskie, J. L. Squier, W. S. Taft, G. S. White, and visiting critics.

Undergraduate Program

The undergraduate curriculum in art, leading to the degree of Bachelor of Fine Arts, provides an opportunity for the student to combine a general liberal education with the studio concentration required for a professional degree. During the first three semesters all students follow a common course of study designed to provide a broad introduction to the arts and a basis for the intensive studio experience in the last three years. Beginning with the third term, students concentrate on painting, sculpture, photography, or printmaking. They may elect additional studio work in any of these subjects during the last two years, with the consent of the instructor, providing the courses are taken in sequence and at the hours scheduled. These courses are designed to promote a knowledge and critical understanding of these arts and to develop the individual student's talent. All members of the faculty in the Department of Art are active, practicing artists, whose work represents a broad range of expression.

Studio courses occupy approximately one-half of the student's time during the four years at

Cornell; the remainder is devoted to a diversified program of academic subjects with a generous provision for electives.

The curriculum in art is an independent program of study within the College of Architecture, Art, and Planning. However, the intimate relationships between the fine arts and training in architecture and city planning is a source of special strength in the Cornell program and affords unusual benefits to the students in these three disciplines.

Although the undergraduate curriculum in art is an excellent background for a career in applied art and offers courses in the use of graphics in modern communications, no specific technical courses are offered in such areas as interior design, fashion, or commercial art.

The department discourages accelerated graduation. However, a student may petition for consideration of early graduation by submission of a petition to the faculty before course enrollment in the spring semester of the student's junior year.

A candidate for the B.F.A. degree who also wants to earn a Bachelor of Arts degree from the College of Arts and Sciences can arrange to do so. This decision should be made early in the candidate's career (no later than the third semester), so that he or she can petition to be registered in both colleges simultaneously. Each student is assigned an adviser in the College of Arts and Sciences to provide needed guidance. Those students who are interested primarily in the history rather than in the practice of art should apply for admission to the College of Arts and Sciences with the objective of pursuing a major in the Department of History of Art in that college. Department of Art studio courses may then be taken as electives.

The B.F.A. program is designed so that students may fulfill the degree requirements of 130 credits with a minimum of 66 credits taken in the Department of Art and a minimum of 55 credits taken outside the department. Within these ranges, students may design their own programs subject to the following limitations:

1) Students must plan their programs to complete 31 credits in one of the studio areas (painting, printmaking, sculpture, or photography), or 37 credits in a special concentration in multimedia. This multimedia program will enable students to fulfill concentration requirements by combining several studio disciplines including out-of-department studio courses such as those offered by the departments of Music, Theatre, and Dance etc. All B.F.A. students must complete a senior thesis in one area of concentration and are required to participate in the Senior Exhibition.

   Students must take four introductory courses in the disciplines of painting, printmaking, sculpture, and photography. They must also take three second-level courses from among the four disciplines. In the area of printmaking, the second-level requirement is fulfilled by taking a second introductory course in lithography, etching, or screen printing.

2) A minimum of 55 electives credits must be taken outside of the department. Students are required to take courses from among three groups which include: Physical and Biological Sciences (minimum of two courses, 6 credits); Social Sciences and History (minimum of three courses, 9 credits); and, Humanities and Expressive Arts (minimum of three courses, 9 credits). In addition, students must take a minimum of four courses in Art and Architecture History, including: Art History 245, Renaissance & Baroque Art; Art History 260, The Modern Era; Art History 280, Asian Tradition; and Architecture 181, History of Architecture I or 182, History of Architecture II (or any art history elective, 200 level and above).

The university requirement of two terms in physical education must be met.

A candidate for the B.F.A. degree at Cornell is required to spend the last two terms of candidacy in residence at the university, subject to the conditions of the Cornell faculty legislation of November 14, 1962.

Students who transfer into the undergraduate degree program in art must complete a minimum of four terms in residence at Cornell and a minimum of 60 credits at the university, of which 30 credits must be taken in the Department of Art, including four terms of studio work. No student may study in absentia for more than two terms.

Rome Program

Students in good standing who have completed the requirements of the first two years of the curriculum are eligible for participation in the Rome Program. Students are admitted to the program by application and review of their record. The Rome studio is offered by the Department of Art. Additional courses in art and architectural history, contemporary Italian culture, and Italian language are offered by other departments participating in the program.

Curriculum

Students are expected to take an average course load of 16 credits per semester during their four years. They must complete a minimum of four introductory courses in painting, sculpture, printmaking, and photography and four in drawing by the end of the third year. All studio courses may be repeated for elective credit.

First Year

Fall Term	*Credits*
110 Color, Form, and Space	3
121 Introductory Painting	3
141 Introductory Sculpture	3
151 Introductory Drawing	3
Elective (freshman writing seminar)	3
	15

Spring Term	*Credits*
One of the following:	3
131 Introductory Etching 132 Introductory Graphics 133 Introductory Lithography	
151 Introductory Drawing	3
161 Introductory Photography	3
Art history elective	3
Elective	3 or 4
	15–16

Second Year

Fall Term	
Art 2nd year studio	7–8
Art history elective	3
251 Drawing II	3
Elective(s)	3
	16–17

Spring Term	
Art 2nd year studio	3–4
Art Studio (concentration)	4
Art history elective	3
Drawing elective	3
Elective(s)	3
	16–17

Third Year

Fall Term	
Art studio (concentration)	4
Issues of Contemporary Art	3
Electives	9–10
	16–17

Spring Term	
Art studio (concentration)	4
Art history elective	3
Electives	9–10
	16–17

Fourth Year

Fall Term	
Fourth-year studio concentration	6
Electives	11
	17

Spring Term	
Senior thesis studio concentration	6
Electives	10–11
	16–17

Course Information

Most courses in the Department of Art are open to students in any college of the university who have fulfilled the prerequisites and who have permission of the instructor.

Fees are charged for all Department of Art courses. For fine arts majors the fee is $40 each semester. Students from outside the department are charged $20 a course. In addition, there are darkroom fees for all photography courses.

To take advantage of the special opportunities afforded by summer study, the department has developed several summer-only courses. Students wanting to satisfy Cornell degree requirements may petition to have these courses substituted for fall- or spring-term required courses.

Courses in Theory and Criticism

ART 110 Color, Form, and Space
Fall or spring. 3 credits. Fall enrollment limited to B.F.A. candidates.
M 9:30–11. N. Daly.
A study of traditional and contemporary ways of drawing and painting. An analysis of color theory and pictorial space.

ART 311 Issues in Contemporary Art
Fall. 3 credits.
Hours to be arranged. S. Poleskie.
A seminar course in issues of contemporary art, including lectures by visiting artists.

ART 317 Art in Rome: Early Christian to the Baroque Age
Fall. 3 credits.
E. Parloto or visiting faculty.
General survey of the early Christian period to the fantastic vision of Piranesi in the eighteenth century. Special emphasis will be placed on the developments of the Renaissance and Baroque periods. Weekly lecture and field trips.

ART 318 Art in Rome: Renaissance in Rome and Florence
Spring. 3 credits.
Hours to be arranged. E. Parloto.
A direct knowledge of art in history text is the aim of this course. Open both to students interested in history and to those concentrating on the visual impact of art. Included are lectures and field trips.

ART 610 Seminar in Art Criticism
Fall or spring. 2 credits; may be repeated for credit. Four terms required for M.F.A. candidates.
Hours to be arranged. V. Kord.
Historical and modern critical opinions and their relation to problems in the theory of art are studied.

Studio Courses in Painting

ART 121 Introductory Painting
Fall, spring, or summer. 3 credits.
Hours to be arranged. Staff.
An introduction to the problems of artistic expression through the study of pictorial composition; proportion, space, shapes, and color as applied to abstract and representational design.

ART 123 Landscape Painting
Summer. 3 credits.
Class meets outdoors at selected sites in the Ithaca area. A different motif is explored each week. Pen, pencil, and water- or oil-based colors (optional) are the materials employed. Analysis and discussion of the landscape work of Corot, Cézanne, van Gogh, Seurat, and others are included.

ART 124 Painting and Drawing
Variable credit (maximum 5). Summer only.
A special summer abroad course with emphasis on artistic expression and techniques, for students at all levels of skill. Included will be a mixture of painting and drawing assignments, self-initiated projects, and drawing sessions with a live model.

ART 221 Painting II
Fall or spring. 4 credits. Prerequisite: Art 121 or permission of instructor.
Hours to be arranged. Staff.
A continuation of Art 121.

ART 321 Painting III
Fall. 4 credits. Prerequisite: Art 221 or permission of instructor.
Hours to be arranged. Staff.
Continued study of the principles of painting and the selection and expressive use of materials and media. Group discussions and individual criticism.

ART 322 Painting IV
Spring. 4 credits. Prerequisite: Art 321 or permission of instructor.
Hours to be arranged. Staff
Continued study of the principles of painting and the selection and expressive use of materials and media. Group discussions and individual criticism.

ART 421 Painting V
Fall. 6 credits. Prerequisite: Art 322 or permission of instructor.
Hours to be arranged. Staff.
Further study of the art of painting through both assigned and independent projects executed in various media. Instruction through group discussions and individual criticism.

ART 422 Senior Thesis in Painting
Fall or spring. 6 credits. Prerequisite: Art 321 or 322 or permission of instructor.
Hours to be arranged. Staff.
Advanced painting project to demonstrate creative ability and technical proficiency.

ART 721–722, 821–822 Graduate Painting
721 and 821, fall; 722 and 822, spring. Credit as assigned. May be repeated for credit. Limited to M.F.A. students in painting.
Staff.
Students are responsible, under staff direction, for planning their own projects and selecting the media in which they are to work. All members of the staff are available for individual consultation.

Studio Courses in Graphic Arts

ART 131 Introductory Intaglio
Fall, spring, or summer. 3 credits.
Hours to be arranged. E. Meyer.
A basic introduction to etching techniques, with emphasis on engraving, lift ground, relief printing, monotypes, and experimental techniques.

ART 132 Introductory Graphics
Fall, spring, or summer. 3 credits.
Hours to be arranged. S. Poleskie.
An introduction to the two-dimensional thought process and the language of vision. Students will explore design projects and the use of graphic materials, including collage, pochoir, and screen printing.

ART 133 Introductory Lithography
Fall, spring, or summer. 3 credits.
Hours to be arranged. G. Page.
The theory and practice of lithographic printing, using limestone block and aluminum plate. Basic lithographic techniques of crayon, wash, and transfer drawing are studied.

ART 231 Intaglio Printing II
Fall or spring. 4 credits. Prerequisite: Art 131 or permission of instructor.
Hours to be arranged. E. Meyer.
Continuation of the study and practice of methods of intaglio printing, with emphasis on techniques and color.

ART 232 Advanced Screen Printing (Book Arts)
Spring. 4 credits. Prerequisite: Art 132 and Art 161 or permission of instructor.
Hours to be arranged. S. Poleskie.
Students will expand their knowledge of screen printing to include photo stencil and printing on diverse materials such as cloth and plastic with the goal of producing a book or a portfolio of prints by the end of the semester.

ART 233 Lithography II
Fall or spring. 4 credits. Prerequisite: Art 133 or permission of instructor.
Hours to be arranged. G. Page.
Continuation of the study and practice of lithographic printing, with emphasis on color.

ART 331 Printmaking III
Fall or spring. 4 credits. Prerequisite: Art 231, 232, or 233 or permission of instructor.
Hours to be arranged. Staff.
Study of the art of graphics through both assigned and independent projects. Work may concentrate in any one of the graphic media or in a combination of media.

ART 332 Printmaking IV
Fall. 4 credits. Prerequisite: Art 331 or permission of instructor.
Hours to be arranged. Staff.
Continuation and expansion of Art 331.

ART 431 Printmaking V
Spring. 6 credits. Prerequisites: Art 332 or permission of instructor.
Hours to be arranged. Staff.
Further study of the art of graphics through both assigned and independent projects executed in various media. Instruction through group discussions and individual criticism.

ART 432 Senior Thesis in Printmaking
Fall or spring. 6 credits. Prerequisite: Art 331 or 332 or permission of instructor.
Hours to be arranged. Staff.
Advanced printmaking project to demonstrate creative ability and technical proficiency.

ART 731–732, 831–832 Graduate Printmaking
731 and 831, fall; 732 and 832, spring. Credit as assigned; may be repeated for credit. Limited to M.F.A. candidates in graphic arts. Prerequisite: permission of instructor.
Staff.
Students are responsible, under staff direction, for planning their own projects and selecting the media in which they will work. Members of the staff are available for consultation; discussion sessions of work in progress are held.

Studio Courses in Sculpture

ART 141 Introductory Sculpture
Fall, spring, or summer. 3 credits.
Hours to be arranged. Staff.
A series of studio problems introduce the student to the basic considerations of artistic expression through three-dimensional design, i.e., modeling in Plasteline, building directly in plaster, casting in plaster, and constructing in wood and metal.

ART 241 Sculpture II
Fall or spring. 4 credits. Prerequisites: Art 141 or permission of instructor.
Hours to be arranged. Staff.
Various materials, including clay, plaster, wood, stone, and metal, are used for exercises involving figurative modeling, abstract carving, and other aspects of three-dimensional form and design. Beginning in the second year, students are encouraged to explore the bronze casting process. The sculpture program, which is housed in its own building, contains a fully equipped bronze casting foundry.

ART 341 Sculpture III
Fall. 4 credits. Prerequisite: Art 241 or permission of instructor.
Hours to be arranged. Staff.

Continued study of the principles of sculpture and the selection and expressive use of materials and media. Group discussions and individual criticism.

ART 342 Sculpture IV
Spring. 4 credits. Prerequisite: Art 241 or permission of instructor.
Hours to be arranged. Staff.
Continuation and expansion of Art 341.

ART 441 Sculpture V
Fall. 6 credits. Prerequisite: Art 342 or permission of instructor.
Hours to be arranged. Staff.
Further study of the art of sculpture through both assigned and independent projects executed in various media. Instruction through group discussions and individual criticism.

ART 442 Senior Thesis in Sculpture
Fall or spring. 6 credits. Prerequisite: Art 341 or 342 or permission of instructor.
Hours to be arranged. Staff.
Advanced sculpture project to demonstrate creative ability and technical proficiency.

ART 741–742, 841–842 Graduate Sculpture
741 and 841, fall; 742 and 842, spring. Credit as assigned. May be repeated for credit. Limited to M.F.A. students in sculpture.
Staff.
Students are responsible, under staff direction for planning their own projects and selecting the media in which they are to work. All members of the staff are available for individual consultation. Weekly discussion sessions of works in progress are held.

Studio Courses in Photography

Darkroom fees for all photography courses

Fee for B & W courses: $70.00

Fee for color courses: $150.00

Fee for an additional B & W course taken the same term: $25.00

Fee for an additional color course taken the same term: $105.00

Out-of-college students—$10 per term course fee.

ART 161 Introductory Photography I (also Architecture 251)
Fall, spring, or summer. 3 credits.
Hours to be arranged. Staff.
A basic lecture-studio course in black and white photography for beginners. Emphasis is on basic camera skills, darkroom techniques, and understanding of photography imagery.

[ART 166 Introduction to Photography for Non-Majors
Not offered 1992–93.]

ART 167 Photography
Variable credit (maximum 5). Summer only.
A special summer-abroad course with emphasis on both the techniques and aesthetics of black-and-white photography, for students at all levels of skill. Initial photographic assignments will be followed by other projects of the student's own choosing.

ART 168 Black-and-White Photography
Summer. 3 credits.
Intended for students at all levels, from introductory to advanced. Emphasis on camera skills, darkroom techniques, and the content of black-and-white photographic imagery.

ART 169 Color Photography
Summer. 3 credits.
Intended for students at all levels, from introductory to advanced. Emphasis on camera skills, darkroom techniques, and the content of color photographic imagery.

ART 261 Photography II (also Architecture 351)
Fall, spring, or summer. 4 credits. Prerequisites: Art 161 or Architecture 251, or permission of instructor.
Hours to be arranged. Staff.
A continuation of Introductory Photography I.

ART 264 Photo Processes
Fall or spring. 4 credits. Prerequisite: Art 161 or permission of instructor.
Hours to be arranged. Staff.
A studio course in alternate and nonsilver photographic, processes. Emphasis is on camera skill, basic techniques and processes, image content, and creative use of photo processes.

ART 265 Studio Photography
Fall or spring. 4 credits. Prerequisite: Art 161 or permission of instructor.
Hours to be arranged. Staff.
A course in the use of medium- and large-format cameras that explores technique, lighting, and the use of larger-format cameras for personal expression both in the studio and outdoors.

ART 361 Photography III/Color
Fall, spring, or summer. 4 credits. A studio course in color photography with emphasis on camera skills, darkroom techniques, and the content of color photography. Prerequisite: Art 161, 262, or permission of instructor.
Hours to be arranged. Staff.
Continued study of creative use of photography, with emphasis on specialized individual projects.

ART 362 Photography IV
Spring. 4 credits. A studio course intended for photography majors and other qualified students. Prerequisite: Art 361 or permission of instructor.
Hours to be arranged. Staff.
A continuation of Art 361.

ART 379 Independent Studio
Summer. Credit by arrangement.
Hours by arrangement. Staff.
Students who have the interest and ability to progress beyond the problems of their particular course may register for additional credits. Students plan courses of study or projects that must meet the approval of the instructors they have selected to guide their progress and criticize the results. A course fee may be charged.

ART 461 Photography V
Fall. 6 credits. Prerequisite: Art 361 or permission of instructor.
Hours to be arranged. Staff.
A studio course intended for photography majors and other qualified students.

ART 462 Senior Thesis in Photography
Fall or spring. 6 credits. Prerequisite: Art 461 or permission of instructor.
Hours to be arranged. Staff.
A studio course intended for photography majors and other qualified students. Advanced photography project to demonstrate creative ability and technical proficiency.

ART 751–752, 851–852 Graduate Photography
751 and 851, fall; 752 and 852, spring. Credit as assigned. May be repeated for credit. Limited to M.F.A. students in photography. Prerequisite: permission of instructor.
Staff.
Students are responsible, under staff direction, for planning their own projects and selecting the media in which they will work. Members of the staff are available for consultation. Discussion sessions of work in progress are held.

Studio Courses in Drawing

ART 151 Introductory Drawing
Fall, spring, or summer. 3 credits.
Hours to be arranged. Staff.
A basic drawing course in the study of form and techniques. Contemporary and historical examples of figure, still life, and landscape drawing are analyzed in discussion.

ART 158 Conceptual Drawing
Summer. 3 credits.
Emphasis on drawing from the imagination. The generation of ideas and their development in sketches is stressed. The intent is not to produce finished art but rather to experience a series of problems that require image and design concepts different from those of the artist working directly from nature.

ART 159 Life and Still-Life Drawing
Summer. 3 credits.
The human figure and still life are studied both as isolated phenomena and in relation to their environment. Focuses on helping the student observe and discover.

ART 251 Drawing II
Fall or spring. 3 credits. Prerequisites: Art 151 or permission of instructor.
Hours to be arranged. Staff.
A continuation of Art 151 but with a closer analysis of the structure of the figure and a wider exploitation of its purely pictorial qualities.

[ART 351 Drawing III
Fall or spring. 3 credits. Prerequisite: Art 251. Not offered 1990–91.
Staff].

ART 352 Anatomy for Artists
Spring. 3 credits. Prerequisites: Art 151, 159, and 251 or permission of instructor.
Hours to be arranged. S. Taft.
Develops basic understanding of the structure of the human figure as it is relevant to artists through an in-depth study of the skeleton and muscle-tendon system. Focuses on improving understanding and skill in design and observation, as well as gaining an understanding of how the materials may be relevant to making art through the study of works by the masters.

Graduate Thesis

ART 712 Graduate Thesis
Spring. Credit as assigned.
Staff.
For graduate students in their last term in the programs in painting, sculpture, printmaking, and photography.

Special Studio Courses

ART 171 Computer Art I
[Fall], spring, or summer. 3 credits.
Hours to be arranged. S. Bowman.

A studio course in the use of the computer as a tool for making art. Introduction to microcomputers and various graphic programs, image grabbing, and 2-d animation.

ART 172 Computer Art II
Fall, spring, or summer. Prerequisite: Art 171 or permission of instructor.
Hours to be arranged. S. Bowman.
A continuation of Art 171, with introduction to graphics programs in multimedia, on Macintosh II systems. Emphasis is on combining graphics, grabbed imagery, with 2d and 3d animation and sound, with output to video.

ART 372 Special Topics in Art Studio
Fall, spring, or summer. Variable credit.
Hours to be arranged. Staff.
An exploration of a particular theme or project.

ART 400 Rome Studio
Fall or spring. 6 credits. Prerequisite: permission of instructor.
Staff.
The content for the Rome studio will be determined by the instructor. Emphasis will be divided between work accomplished in the studio and work executed outdoors in the environs of Rome. Media will consist primarily of painting, drawing, sculpture, and photography, or those assigned by the instructor.

ART 472–476 Independent Studio
Fall, spring, or summer. Variable credit (maximum, 6). Students may register for two studios in a semester. May be repeated for credit. Prerequisite: written permission of instructor.
Department staff.

ART 472 Independent Studio – Painting

ART 473 Independent Studio – Graphics, Lithography, Intaglio

ART 474 Independent Studio – Sculpture

ART 475 Independent Studio – Drawing

ART 476 Independent Studio – Photography

CITY AND REGIONAL PLANNING

R. S. Booth, chair; S. Baugher, L. Beneria, S. Christopherson, P. Clavel, J. Cody, S. Czamanski (emeritus), M. Drennan, J. F. Forester, W. W. Goldsmith, W. Isard, B. G. Jones, B. Kelly (emeritus), D. Lewis, P. Olpadwala, K. C. Parsons, J. W. Reps (emeritus), S. Saltzman, S. W. Stein, M. A. Tomlan, R. T. Trancik, T. Vietorisz (visiting), M. Wilder

The department offers several programs of study at both the undergraduate and graduate levels.

The Undergraduate Program in Urban and Regional Studies

The four-year Bachelor of Science program in urban and regional studies offers students an opportunity to direct their education toward an understanding of urban and regional problems and solutions. The curriculum acquaints students with the physical, social, political, economic, and environmental forces that confront cities and regions and contribute to their growth and decline. The curriculum draws on strengths in the department and is supplemented by course work in related areas in other departments at Cornell.

The first two years in this program are a general education in the liberal arts and sciences. Writing and quantitative skills are developed, and an exposure is provided to course work in the natural and social sciences, the expressive or design arts, and the humanities. Two introductory courses in urban and regional issues are also taken during the first two years. During the junior and senior years ten specific courses are taken to provide a significant foundation of knowledge in the major. Additional directed electives will permit the student to gain greater depth of knowledge and acquire a broader understanding of topics of individual interest. These courses may be in any related subject, including, for example, housing, urban design, neighborhoods, energy, environmental controls, economic development, architecture, land use, social policy, and international planning.

Basic Requirements for Graduation

1) General education (during the first four terms)

a. Freshman writing seminars: 6 credits

b. Foreign language: qualification in one foreign language

c. An approved course sequence (minimum of 6 credits) in each of the five categories below: 30 credits

1. a. Biological sciences or

   b. Physical sciences

2. a. Social sciences (other than economics) or

   b. History

3. a. Humanities or

   b. Expressive arts or design arts

4. Mathematics

5. Economics

2) Major concentration: 50 to 52 credits

a. Specific course requirements (38 to 40 credits)

CRP 100, The American City

CRP 101, The Global City

CRP 314, Planning, Power, and Decision Making, or Government 311, Urban Politics

CRP 315, The Progressive City

CRP 320, Introduction to Statistical Reasoning for Urban and Regional Analysis

CRP 321, Introduction to Quantitative Methods for the Analysis of Public Policy

CRP 361, Seminar in American Urban History, or History 332 or 334, The Urbanization of American Society

CRP 400, Introduction to Urban and Regional Theory

CRP 401, Urban Political Economy

CRP 480, Environmental Politics

CRP 481, Principles of Spatial Design and Aesthetics

CRP 482, Urban Land Use Concepts

b. Directed electives (related to urban and regional studies): 12 credits (at least 6 credits to be taken outside CRP)

3) Free electives: 26 to 28 credits

a. 12 credits during first four terms

b. 14 to 16 credits during last four terms

Required courses for graduation: 34

Required Credits: 120

The university requirement of two terms of physical education must be met during the first two terms.

NOTE: The above-stated requirements apply to students enrolled as of the spring 1992 semester. These requirements are in the process of being changed for students entering during and following the fall 1992 semester. Incoming students should check with the director of the Urban and Regional Studies Program.

Honors Program

Each year a small number of well-qualified junior-year students will be accepted into the honors program. Each honors student will develop and write a thesis under the guidance of his or her faculty adviser. There will be a seventy-five-page limit on each honors thesis.

Off-Campus Opportunities

Cornell-in-Washington Program. Students in good standing may be eligible to earn degree credits in the Cornell-in-Washington program through course work and an urban-oriented internship in Washington, D.C. Students may work as interns with congressional offices, executive-branch agencies, interest groups, research institutions, and other organizations involved in the political process and public policy. Students also select one or two other seminars from such fields as government, history, economics, human development and family studies, architectural history, and agricultural economics. All seminars are taught by Cornell faculty members and carry appropriate credit toward fulfillment of major, distribution, and other academic requirements.

Cornell Abroad. Cornell encourages qualified undergraduates to study abroad in the belief that exposure to foreign cultures is an important component of a good education. In an increasingly interdependent world, the experience of living and learning in a foreign country is invaluable. With this in mind, the university is continuing to develop study abroad opportunities. Current programs are available in Great Britain, Spain, and Germany. Opportunities in Asia, the Mideast, and France should be forthcoming. The department encourages its students to explore these opportunities.

Cornell-in-Rome Program. The College of Architecture, Art, and Planning has a teaching facility in Rome located in the sixteenth-century Palazzo Massimo. Students in good standing are eligible to earn degree credits through course work undertaken with Cornell faculty assigned to Rome and with accredited instructors. Courses are available in areas of urban development, regional development, and architecture and art.

Research and fieldwork. Students are welcome to work with department faculty members on research or other opportunities that are appropriate to their particular interests. Fieldwork and community-service

options also exist for students in the Urban and Regional Studies Program.

Additional Degree Options

Linked degree options. Urban and regional studies students have the opportunity to earn both a Bachelor of Science degree and a Master of Regional Planning (M.R.P.) degree in a fifth year of study. Ordinarily the professional M.R.P. degree requires two years of work beyond that for the bachelor's degree. This arrangement shortens that time by about one year. A minimum of 30 credits and a master's thesis or thesis project are required for the M.R.P. degree. Students apply to the Graduate School, usually in the senior year.

Dual degree option. A student in the Cornell College of Arts and Sciences currently can earn both a B.A. in an arts college major, plus a B.S. in urban and regional studies in a total of five years. Special requirements have been established for this dual degree program. Cornell students interested in pursuing the dual degree program should contact either the director of the Urban and Regional Studies Program or the appropriate dean of the College of Arts and Sciences for further information.

Admissions Requirements and Procedures

Among the most important criteria for admission to the Urban and Regional Studies Program are intellectual potential and commitment—a combination of ability, achievement, motivation, diligence, and use of educational and social opportunities. Nonacademic qualifications are important as well. The department encourages students with outstanding personal qualities, initiative, and leadership ability. Above all, the department seeks students with a high level of enthusiasm and depth of interest in the study of urban and regional issues. Applicants must complete a university admission application.

Transfer Students

In most cases, transfer applicants should no longer be affiliated with a high school and should have completed no fewer than 12 credits of college or university work at the time of application. A high school student who has completed graduation requirements at midyear and is taking college courses for the rest of the academic year should apply as a freshman. Prospective candidates who believe that their circumstances are exceptional should consult with the director of admissions in the Cornell division of interest to them before filing an application.

Forms for transfer application and financial aid are available from the Cornell University Office of Admissions, 410 Thurston Avenue, Ithaca, New York 14850–2488. Official transcripts of all high school and college work must be submitted along with SAT or ACT scores and letters of recommendation.

It is desirable for prospective transfers to have taken at least 6 credits in English. In addition, students should have taken basic college-level courses distributed across the natural and social sciences, humanities, and mathematics. Those applicants whose previous course work closely parallels the general education portion of the urban and regional studies curriculum will have relative ease in transfer. However, as there are no specific requirements for transfer, students with other academic backgrounds, such as engineering, architecture, fine arts, management, and agriculture, are eligible to apply.

Although an interview is not required, applicants are urged to visit the campus. Applicants who want further information regarding urban and regional studies may contact Professor Richard S. Booth, Program Director, Urban and Regional Studies, Cornell University, 106 West Sibley Hall, Ithaca, New York 14853–6701 (telephone: 607/255–4613).

The Graduate Program in City and Regional Planning

Planning seeks to guide the development of the economic, social, natural, and built environments so that the needs and aspirations of all people may be better satisfied.

The major concentrations of course work in city and regional planning are in the following areas:

Built environment and urban development planning is concerned with physical facilities; the social, economic, and environmental forces that affect their design; and the process of development, plan making and administration.

History and historic preservation planning is a special program of study preparing students for work in history, analysis, and preservation of buildings, urban environments, and neighborhoods, including downtown business areas.

Regional planning and regional science are concerned with socioeconomic issues and functional planning at the regional level, the forces that generate economic growth and social development, and the ways in which resources can best be used.

Local and regional economic development is concerned with understanding and influencing how economic change may be harnessed to the benefit of communities, counteracting plant closings and more general regional decline and stimulating more equitable programs of socioeconomic change and development.

International planning offers a broad range of courses in international economic development, development planning, and political economy.

Quantitative methods and policy analysis courses are offered to prepare planners and researchers for a variety of situations and problems.

Complementing these concentrations, planning theory and political economy courses examine the organizational and planning processes and the political and economic conditions in which planning and international development operate.

Several graduate degrees are offered: the Ph.D.; the Master of Regional Planning (M.R.P.), for a two-year program; the Master of Arts (M.A.) in historic preservation planning, for a two-year program; and, in special cases, the Master of Professional Studies (International Development) [M.P.S.(I.D.)], for the twelve-month international planning program.

Off-Campus Opportunities

Rome Program. Graduate students have the opportunity to spend one or two semesters in Rome, studying at Cornell's center at the Palazzo Massimo. Instruction is given by Cornell professors-in-residence and by other faculty. The program is structured to include work assignments in one of the international development organizations headquartered in Rome.

Course Information

Most courses in the Department of City and Regional Planning are open to students in any college of the university who have fulfilled the prerequisites and have the permission of the instructor.

The department attempts to offer courses according to the information that follows. However, students should check with the department at the beginning of each semester for late changes.

Undergraduate Program in Urban and Regional Studies

CRP 100 The American City
Fall. 3 credits.
M. Wilder.
An introductory course on the evolution of urban problems and opportunities facing the majority of this country's population as we approach the last decade of the twentieth century. Readings, discussions, and brief papers exploring topics ranging from suburban development to central city poverty, from environmental threats to downtown revitalization, and from municipal finance to the new position of women in the urban economy.

CRP 101 The Global City: People, Production, and Planning in the Third World
Spring. 3 credits.
Staff.
A critical look at the physical and social development of giant cities in the Third World. Their origins, roles, contributions, and shortcomings are examined. Their place in world political economy is evaluated. Policy prescriptions for their principal problems are discussed.

CRP 108 FWS: Environment and Society: The Delicate Balance
Fall. 3 credits.
J. Cody.
This freshman writing seminar addresses the delicate balance that must be maintained between societal needs and demands and environmental quality. It uses several important texts that examine and challenge society's widespread and deep-rooted tendencies to ignore the social, economic, and environmental consequences of degrading the natural environment. Students work extensively on improving writing skills.

CRP 109.01 Freshman Writing Seminar
Fall or spring. 3 credits.
Hours to be arranged. Staff.
Topic to be announced.

CRP 109.02 FWS: In Search of American Cities
Spring. 3 credits.
M. Wilder.
An unusual course structure is used to give students broad exposure to ongoing changes in the social, political, economic, and physical

character of U.S. cities. Each week students will "visit" a different city by way of readings, oral presentations, discussions, and brief papers that touch on major aspects of the city's economic, social, and political history; the city's physical character and regional context; and recent planning or policy issues.

[CRP 218 Economics of Gender
Spring. 3 credits. Not offered 1992–93.]

CRP 261 Urban Archaeology
Fall or spring. 3 credits.
S. Baugher.
Urban archaeologists study both urban development and the pre-urban past that lies within the present boundaries of cities. Thus not all archaeology in a city is of a city. While several centuries of urban development are often found at the upper level of archaeological sites, lower horizons often reveal cultural diversity. This course will examine the methods and unique political and economic problems associated with excavating in urban environments while exploring the commercial, industrial, residential, and transportation-related sites found in modern cities. An introductory course, designed for undergraduates.

CRP 271 Introduction to African Development (also ASRC 271)
Fall or spring. 3 credits.
Staff.
A survey of development problems in Sub-Saharan Africa, including the importance of the natural resource base, the policy and institutional factors affecting development, and the human resource potential in the continent.

CRP 314 Planning, Power, and Decision Making
Fall. 3 credits.
J. Forester.
This seminar examines various bases of political and professional power. We ask, What do professionals who want to serve the public need to know about power and decision-making processes in the institutional settings in which they operate? How and why can professionals make a difference when facing problems characterized by great complexity and severe inequalities among affected groups?

CRP 315 The Progressive City
Spring. 3 credits.
P. Clavel.
A review of attempts to incorporate the interest of working-class and poor constituencies through majority control of local governments. Topics to be covered include the role of the city in class formation; historical perspectives on urban political administration; contemporary populist, socialist, and progressive urban governments; and the search for an economic basis for progressive reforms.

CRP 320 Introduction to Statistical Reasoning for Urban and Regional Analysis
Fall. 3 credits.
Staff.
An introduction to the role and use of quantitative methods in the study of urban and regional issues. Emphasis will be on statistical and related computer methods for the formulation, analysis, and testing of hypotheses and models of social, economic, and physical phenomena of cities and regions. This course will cover applicable methods in probability, descriptive statistics, estimation, hypothesis testing, and regression.

CRP 321 Introduction to Quantitative Methods for the Analysis of Public Policy
Spring. 3 credits.
Staff.
An introduction to the role and use of quantitative methods in the study of urban and regional issues. This course will focus on various types of models commonly used to analyze urban and regional policy, including techniques for decision analysis, linear programming, cost-benefit analysis, simulation, and regression models, among others. Strengths and weaknesses of those methods will also be considered.

CRP 360 Pre-Industrial Cities and Towns of North America (also CRP 666)
Fall. 3 credits. S-U grades optional.
S. Baugher.
The pre-industrial approaches to the founding, design, and development of towns and cities in North America until 1815 demonstrate how various American Indian civilizations as well as diverse European cultures have each brought their perspectives to the organization of town and city living. American Indian case studies will include Mayan and Aztec cities, the city of Cahokia, and the towns of the Pueblos, Creeks, and Iroquois. The experiences of Europeans in North America will include Spanish, French, Dutch, and English. This course is a recommended complement to CRP 361.

CRP 361 Seminar in American Urban History (also CRP 662)
Spring. 3 credits. Prerequisite: permission of instructor.
J. Cody.
Seminar in the historical evolution of the American city. Emphasis on factors in urban growth, the process of urbanization, the urban reform movement, and intellectual and social responses to the city.

CRP 363 American Indians, Planners, and Public Policy (also CRP 547)
Spring. 3 credits. S-U grades optional.
S. Baugher.
Contemporary American Indian people, their reservations, and their cultural heritages are all affected, often adversely, by decisions made by public agencies and private enterprise. To benefit non-Indian cities and economic growth, reservations are sometimes flooded, polluted, strip-mined, and deforested. Archaeological sites and burial grounds are often destroyed. The central focus of the course is how to address urban and regional problems without imperiling the cultural survival of minorities.

CRP 382 Urban Housing: Sheltered vs. Unsheltered Society (also CRP 582)
Fall. 4 credits.
M. Wilder.
Homelessness is the latest in a continuing list of terms to describe unmet housing needs. To understand how and why such needs persist, even in good economic times, one must examine the nature of interactions between housing policies and housing market forces. This course examines the complex interaction of public and private actions in the development and redevelopment of urban housing. More specifically, the course seeks to investigate the many ways in which private and public policy decisions determine which groups in society will have access to housing. This course is appropriate for students with an interest in urban housing and a background in any of the following areas: urban economics, urban sociology, anthropology, history, or geography. The course will consist of lectures, a wide variety of readings, and guest speakers. Students will be evaluated on the basis of class discussions, two exams, a 15–20 page paper, and an oral presentation.

CRP 400 Introduction to Urban and Regional Theory
Fall. 4 credits. Open to juniors and seniors.
B. G. Jones.
Introductory review of theories dealing with the spatial distribution of population and economic activity, drawn from various social science disciplines such as geography, economics, and sociology. Review of recent research dealing with such topics as population distribution, migration, location of industry and economic activity, and the spatial organization of urban and regional social systems.

CRP 401 Seminar in Urban Political Economy
Spring. 4 credits. Prerequisites: introductory economics or sociology; for URS students, CRP 400 also.
W. W. Goldsmith.
The world economy, the global city, and social change. Population, technology, and work in industrial and developing countries. Race, ethnicity, and nationality. Profits, subsistence, and poverty. Students may read and direct discussions on outstanding texts, write book reviews, and prepare brief reports.

CRP 404 Urban Economics (also CRP 604)
Fall or spring. 4 credits. Prerequisite: basic economics.
Staff.
Urban phenomena are analyzed from an economic point of view. Areas examined include economic aspects of urbanization processes and policies, determinants of urban growth and decline, urban land and housing markets, urban transportation, and urban public services. Some time will be spent in discussing problems of cities in developing countries.

[CRP 415 Gender Issues in Planning and Architecture
Spring. 3 or 4 credits. Not offered 1992–93.]

CRP 417 Industrial Restructuring: Implications for State and Local Policy (also CRP 517)
Fall. 4 credits.
S. Christopherson.
A basic introduction to new issues arising from the way in which national and international economic shifts are affecting diverse United States localities. The course will focus on intra-industry restructuring, the location of economic activities, and state and local economic policy. Cases will be drawn from a variety of industries and national situations, with specific application to New York and other Northeast locations.

CRP 421 Introduction to Computers in Planning (also CRP 522)
Fall. 4 credits.
Staff.
Students learn how to use microcomputers and software packages in the planning and problem-solving processes. Included are word processing, spreadsheets, mapping, and other types of packages that are useful for

other classes and for professional work in the field. (WordPerfect, Lotus 1-2-3, dBase and MacGIS are examples of packages that have been taught in previous years.)

CRP 442 The Sociology of Science (also Biology and Society 442)
Fall. 4 credits.
T. J. Pinch.
A view of science less as an autonomous activity than as a social institution. We will discuss such issues as controversies in science, textual analysis, gender and the social shaping of scientific knowledge.

[CRP 448 Social Policy and Social Welfare (also CRP 548)
Spring. 4 credits. Not offered 1992–93.]

CRP 451 Environmental Law (also CRP 551)
Fall. 4 credits.
R. S. Booth.
An introduction to how the legal system handles environmental problems. Study of federal statutes such as the National Environmental Policy Act, the Clean Air Act, and the Clean Water Act, and of important judicial decisions that have been handed down under federal environmental statutes and regulations. Discussion of environmental law topics from a policy management perspective. This course is designed for undergraduate and graduate students interested in urban issues, planning, natural resources, government, environmental engineering, law, business, architecture, landscape architecture, etc. Course assignments for graduate students will differ in some aspects from those for undergraduates.

CRP 457 Community Service Fieldwork
Fall or spring. 4 credits variable.
Faculty.
Undergraduate students work under the direction of a faculty member in the CRP department on a project that assists a public or nonprofit organization. Projects will involve urban and regional issues as defined by a "client" and agreed upon by the faculty member.

CRP 461 Methods of Archival Research
Fall. 3 credits.
K. C. Parsons.
Examination of methods of using archival materials including documents in the Cornell archives and regional history collection, for research in the history of architecture, historic preservation, and history of urban development.

CRP 480 Environmental Politics
Spring. 4 credits.
R. S. Booth.
Examines the politics of public decisions affecting the environment. Focuses on the roles played by different political actors, the powers of various interest groups, methods for influencing environmental decisions, and the political and social impacts of those decisions.

CRP 481 Principles of Spatial Design and Aesthetics (also CRP 581 and Landscape Architecture 480)
Fall. 3 credits. Course enrollment is restricted to planning and landscape architecture students unless special permission is granted by instructor.
R. T. Trancik.
A lecture course that introduces the spatial and visual design vocabularies of cities. Aesthetic principles and theories of design are investigated for different types of urban spaces drawn from a variety of international examples, historic and modern. Included in the course are design methods and applications in the contemporary urban context of Europe and North America.

CRP 482 Urban Land Use Concepts
Fall. 3 credits.
S. Stein.
Explorations of the use of land in urban areas, with an emphasis on the experience of North American cities. The course reviews use types, use characteristics, and use relationships in terms of conflicting social and economic demands. Concepts of organizing urban space in the past and present are reviewed. Physical planning, site planning and urban design issues are discussed.

CRP 490 Student-Faculty Research
Fall or spring. 1–4 credits. Limited to undergraduate students in the Urban and Regional Studies Program. S-U grades only.
Hours to be arranged. Staff.
Research, reading, and/or writing project in which a student and faculty member choose a topic related to urban and regional studies.

CRP 492 Honors Thesis Research
Fall or spring. 4 credits. Limited to Urban and Regional Studies Program majors who have been selected as honor students by the department faculty.
Hours to be arranged. Staff.
Each selected student works with his or her thesis adviser.

CRP 493 Honors Thesis Writing
Fall or spring. 4 credits. Prerequisite: Completion of CRP 492.
Hours to be arranged. Staff.
Each selected student works with his or her thesis adviser.

CRP 495 Special Topics
Fall or spring. 3 credits. Hours to be arranged.
Staff.

CRP 497 Supervised Readings
Fall or spring. Variable 4 credits. Limited to upperclass students. Prerequisite: permission of instructor.
Staff.

Graduate Courses and Seminars

Courses numbered from 500 to 599 and 600 to 699 are generally considered introductory or first-year courses; those numbered from 700 to 799 and 800 to 899 are generally considered more advanced. Upperclass undergraduate courses are numbered from 300 to 499. (Undergraduate students with the necessary prerequisites and permission of the instructor may enroll in courses numbered 500 and above.)

CRP 500 Urban and Regional Theory
Fall. 4 credits.
W. W. Goldsmith.
A review of attempts by the various social sciences to understand the contemporary city and its problems, particularly as seen by planners. Material is drawn from urban and regional economics, human ecology, urban sociology, psychology, anthropology, and geography in order to explain the location, size, form, and functioning of cities. Traditional and contemporary critical theory is examined as it applies to physical, social, and economic problems of the modern city. Major texts will be read, criticized, and discussed in seminars.

CRP 511 Concepts and Issues in Planning Practice
Fall. 4 credits.
P. Clavel.
A seminar for graduate students and others interested in an in-depth introduction to the main ideas and concepts that underlie the practice of city and regional planning. Weekly discussions will focus on selected articles and books. Interrelations between national, state, and local practices and policies, and developments in methodology, organization, and the political environment, will be explored.

[CRP 515 Gender Issues in Planning and Architecture (also CRP 415)
Spring. 3 or 4 credits. Offered alternate years. Not offered 1992–93.
S. Christopherson.]

CRP 517 Industrial Restructuring: Implications for State and Local Policy (also CRP 417)
Fall. 4 credits.
S. Christopherson.
A basic introduction to new issues arising from the ways in which national and international economic shifts are affecting diverse United States localities. The course will focus on intraindustry restructuring, the location of economic activities, and state and local economic policy. Cases will be drawn from a variety of industries and national situations, with specific application to New York and other locations in the Northeast.

CRP 520 Statistical and Mathematical Concepts for Planning
Fall. 3 or 4 credits.
S. Saltzman or staff.
An introduction to statistical and mathematical concepts and methods of importance in planning and policy analysis. Topics will include matrix algebra, probability, sampling, estimation, and regression as well as the use of a microcomputer statistical package.

CRP 521 Mathematical Foundation for Planning Analysis.
Fall. 1 credit. S-U only. Meets for two hours, once each week, for approximately half the semester.
Staff.
Review of mathematical foundations for planning analysis. Topics include probability statistics, mathematical functions, and matrix algebra. Intended for students with prior course work as a refresher course in preparation for higher-level courses in planning analysis. Departmental permission required.

CRP 522 Introduction to Computers in Planning (also CRP 421)
Fall. 4 credits.
Staff.
Students learn how to use microcomputers and software packages in the planning and problem-solving processes. Included are word processing, spreadsheets, mapping, and other types of packages that are useful for other classes and for professional work in the field. (WordPerfect, Lotus 1-2-3, dBase, and MacGIS are examples of packages that have been taught in previous years.)

CRP 541 The Politics of Technical Decisions I (also Government 628 and Biology and Society 415)
Spring. 4 credits. Cosponsored by the Program on Science, Technology, and Society.
P. Edwards.

Political aspects of decision making in technical areas. Examines the origins and characteristics of "technical politics," the role of experts in government, and the problem of expertise in a democratic system. Alternatives to current decision-making procedures are explored. Explores the politics of artifacts and cultures as well as government.

CRP 546 Conflict Resolution in Community and Environment
Fall. 3 credits.
J. Forester.
This course will explore the theories and techniques of conflict resolution as they apply to community, environmental, and related public policy disputes. Analysis will complement skill-building. Issues of power, participation, and strategy are central to our examinations of negotiation and mediation practice.

CRP 547 American Indians, Planners, and Public Policy (also CRP 363)
Spring. 3 credits. S-U grades optional.
S. Baugher.
Contemporary American Indian people, their reservations, and their cultural heritages are all affected, often adversely, by decisions made by public agencies and private enterprise. To benefit non-Indian cities and economic growth, reservations are sometimes flooded, polluted, strip-mined, and deforested. Archaeological sites and burial grounds are often destroyed. The central focus of the course is how to address urban and regional problems without imperiling the cultural survival of minorities.

[CRP 548 Social Policy and Social Welfare (also CRP 448)
Spring. 4 credits. Not offered 1992–93.]

CRP 549 Ethics and Practical Judgment in Planning
Spring. 4 credits variable.
J. Forester.
An introduction to problems of practical judgment and ethics as they arise in planning and public-serving professional practice. Issues such as consent, interests, deliberation, and legitimacy are central concerns.

CRP 550 Built Environment
Fall. 3 credits.
S. Christopherson.
This course is intended to introduce graduate-level students to the study of the built environment. This course will include: 1) theoretical approaches to the study of the built environment; 2) an introductory survey of the literature on built environment "elements," such as streets, grids, houses; 3) consideration of methods used to understand how people affect and are affected by their immediate environment; and 4) special topics, particularly, historic landscapes and historic preservation. This course will emphasize examples from the United States but some international comparisons will be drawn.

CRP 551 Environmental Law (also CRP 451)
Fall. 4 credits.
R. S. Booth.
An introduction to how the legal system handles environmental problems. Study of federal statutes such as the National Environmental Policy Act, the Clean Air Act, and the Clean Water Act, and of important judicial decisions that have been handed down under federal environmental statues and regulations. Discussion of environmental law topics from a policy management perspective. This course is designed for undergraduate and graduate students interested in urban issues, planning, natural resources, government, environmental engineering, law, business, architecture, landscape architecture, etc. Course assignments for graduate students will differ in some aspects from those for undergraduates.

CRP 552 Urban Land-Use Planning I
Fall. 3 credits.
S. Stein.
Surveys, analyses, and plan-making techniques for guiding physical development of urban areas; location requirements, space needs, and interrelations of land uses. Emphasis on residential, commercial, and industrial activities and community facilities; housing and neighborhood conditions. Lectures, seminars, and field exercises.

CRP 553 Urban Land-Use Planning II
Spring. 3 credits. Prerequisite: CRP 552 or permission of instructor.
K. C. Parsons.
In-depth consideration of special issues in urban land-use planning, such as industrial districts, large-scale integrated development, Planned Unit Development, public and institutional facilities, open space, land banking, central business districts, neighborhoods, energy impacts, transportation impacts, and others.

CRP 555 Urban Systems Studio (also Landscape Architecture 602)
Spring. 6 credits. Prerequisite: permission of instructor.
R. T. Trancik.
Application of urban design and town planning techniques to specific contemporary problems of city environments. Issues of urbanism are investigated and applied to physical design interventions involving the street, square, block, garden, and park systems. Topics covered in the studio include urban land-use development, spatial systems and aesthetics, and public and private implementation of urban-design plans. This is a specially arranged collaborative studio with the Landscape Architecture Program.

CRP 556 Built-Environment Education Workshop
Fall. 4 credits
M. Tomlan.
Interdisciplinary teams of students from planning, architecture, landscape architecture, historic preservation, and other environmental design disciplines work in classrooms with schoolchildren and teachers to deepen their understanding of the built environment and to encourage their participation in the shaping of their own environment. Work in local schools is emphasized.

CRP 558 City and Regional Planning Workshop
Fall and spring. 4 credits. S-U only.
S. Stein.
Students work on urban issues, such as housing, traffic and parking, economic development, zoning, and related planning issues, with public or non-profit organizations in New York State. Projects are undertaken on a community-service basis for "clients" who specifically request planning assistance. Students work individually or in teams.

CRP 560 Documentation for Preservation (also Architecture 586)
Fall or spring. 3 credits.
M. A. Tomlan.
Methods of identifying, recording, collecting, processing, and analyzing information dealing with historic and architecturally significant structures, sites, and objects.

CRP 561 Historic Preservation Planning Workshop: Surveys and Analyses (also Architecture 588)
Fall or spring. 4 credits.
Staff.
Techniques for the preparation of surveys of historic structures and districts; identification of American architectural styles, focusing on upstate New York; and explorations of local historical resources, funding sources, and organizational structures. Lectures and training sessions. Emphasis on fieldwork with individuals and community organizations.

CRP 562 Perspectives on Preservation (also Architecture 585)
Fall. 3 credits.
J. Cody.
Introductory course for preservationists. A survey of the historical development of preservation activity in Europe and America leading to a contemporary comparative overview. Field trips to notable sites and districts.

CRP 563 Problems in Contemporary Preservation Practice (also Architecture 584)
Spring. Variable credit.
M. A. Tomlan.
A review and critique of ongoing preservation projects and an investigation of areas of expertise currently being developed. Presented by staff and guest lecturers.

CRP 564 Building Materials Conservation (also Architecture 587)
Spring. 3 credits. Open to juniors, seniors, and graduate students.
M. A. Tomlan.
A survey of the development of building materials in the United States, chiefly during the nineteenth and early twentieth centuries, and a review of the measures that might be taken to conserve them.

CRP 565 Fieldwork or Workshop in History and Preservation
Fall or spring. Variable credit.
M. A. Tomlan.
Work on applied problems in history and preservation planning in a field or laboratory setting or both.

CRP 567 Measured Drawing (also Architecture 583)
Fall. 3 credits. For undergraduate architecture students and graduate students in history and preservation. Prerequisite: permission of instructor.
M. A. Tomlan.
Combines study of architectural drawing as historical documents with exercises in preparing measured drawings of small buildings. Presents the basic techniques of studying, sketching, and measuring a building and the preparation of a finished drawing for publication.

CRP 569 Archaeology in Historic Preservation Planning
Spring. 3 credits.
S. Baugher.
Increasingly mandated by federal, state, and local legislation, archaeology plays an important role in planning and land-use decisions. Today, archaeology is integrated with the regulatory processes in historic preservation and environmental review, as well as continuing to influence the design and interpretation of national parks, historic battlefields and historic landmarks. Archaeological research reveals significant insights from the past regarding issues such as public landfill, waste disposal, soil erosion, water quality, and environmental change. Case studies from the United States, Canada, Great Britain, Italy, and Mexico highlight these issues. A graduate level seminar open to upper-level undergraduates.

CRP 574 Legal Aspects of International Planning
Fall. 3 credits. Offered alternate years.
Staff.
Legal systems vary substantially around the world. Planners operate within the parameters established by the legal system of the nation in which they are working. This course allows each student to examine the legal structure of a particular nation (chosen by the student) and to explore how that country's legal system shapes/controls decisions regarding the use, management, and development of land resources. The course emphasizes written and oral presentations.

CRP 581 Principles of Spatial Design and Aesthetics (also CRP 481 and Landscape Architecture 480)
Fall. 3 credits. Course enrollment is restricted to planning and landscape architecture students unless special permission is granted by instructor.
R. T. Trancik.
A lecture course that introduces the spatial and visual design vocabularies of cities. Aesthetic principles and theories of design are investigated for different types of urban spaces drawn from a variety of international examples, historic and modern. Included in the course are design methods and applications in the contemporary urban context of Europe and North America.

CRP 582 Urban Housing: Sheltered vs. Unsheltered Society (also CRP 382)
Fall. 4 credits.
M. Wilder.
Homelessness is the latest in a continuing list of terms to describe unmet housing needs. To understand how and why such needs persist, even in good economic times, one must examine the nature of interactions between housing policies and housing market forces. This course examines the complex interaction of public and private actions in the development and redevelopment of urban housing. More specifically, the course seeks to investigate the many ways in which private and public policy decisions determine which groups in society will have access to housing. This course is appropriate for students with an interest in urban housing and a background in any of the following areas: urban economics, urban sociology, anthropology, history, or geography. The course will consist of lectures, a wide variety of readings, and guest speakers. Students will be evaluated on the basis of class discussions, two exams, a 15–20 page paper, and an oral presentation.

CRP 604 Urban Economics (also CRP 404)
Fall or spring. 4 credits. Prerequisite: basic economics.
Staff.
Urban phenomena are analyzed from an economic point of view. Areas examined include economic aspects of urbanization processes and policies, determinants of urban growth and decline, urban land and housing markets, urban transportation, and urban public services. Some time will be spent in discussing problems of cities in developing countries.

CRP 613 The Political Economy of Women and Work (also Women's Studies 613)
Fall. 3 credits.
L. Beneria.
This course focuses on different approaches to the analysis of women's work in the household and the labor market from an economic and feminist perspective. Topics include household theory and the gender division of labor in the home and the labor market; labor force participation; wage differentials, segregation, labor market segmentation, and discrimination; class, race, and gender issues; comparable worth and other labor market policies; gender and economic restructuring; family policies, demography, and social change. The empirical material in the course concentrates mostly but not exclusively on the United States.

CRP 614 Internation Development and Women (also Women's Studies 614)
Spring. 3 credits.
L. Beneria.
A continuation of CRP 613. The focus here is on international development process, with an emphasis on the Third World and on differences and commonalities between regions and countries. The analysis is placed within the context of the global economy and it emphasizes issues related to cross-cultural perspectives on gender, household organization, the division of labor, labor market dynamics, the conditions of women's employment, and current topics such as household survival strategies and structural adjustment policies.

CRP 615 The Politics of Planning
Spring. 4 credits.
P. Clavel.
This graduate-level seminar explores the relationship between the persons who do planning and the community, political, and social movement context for planning. A range of political models is addressed, and literature in politics, sociology, and organizational theory is part of the coverage. Methodology of field research is part of the course, and students will be encouraged to design research that puts them in touch with actual cases, persons, and recent local histories.

[CRP 616 Development and Change in the World Economy
Spring. 3 credits. Letter grade only. Not offered 1992–93.]

CRP 620 Planning Analysis
Spring. 4 credits.
B. G. Jones.
A survey of commonly used techniques for analyzing various aspects of subnational socioeconomic systems. Emphasizes planning applications.

CRP 630 Local Economic Development Policy—Seminar
Spring. 4 credits.
M. Wilder.
This course examines the impacts of urban economic restructuring on employment and income opportunities in U.S. cities. Particular attention is focused on the ways in which these effects vary by race and gender. Urban policy responses are evaluated in light of the changing economic, demographic, and political character of U.S. metropolitan areas. Alternative policy strategies are examined which seek to redistribute economic resources. Course requirements include a midterm exam, a case study report, and an oral presentation.

[CRP 631 Local Economic Policy—Field Workshop
Fall. 4 credits.]

CRP 642 Critical Theory and the Micropolitics of Practice
Spring. 4 credits variable.
J. Forester.
Trying to "solve problems," planners and policy analysts set agendas, shape participation, negotiate relations of power. This seminar explores theories illuminating the communicative micro-politics of their daily practice. We explore issues of power and discourse, practical judgment and deliberation, productive and reproductive aspects of ordinary speech and action.

CRP 645 Introduction to Public Policy Analysis and Management
Spring. 3 credits. Prerequisite: CRP 520 or equivalent.
Staff.
Introduction to systematic methods and processes for analyzing issues and problems of public policy and management. Roles of economic analysis and of analytic techniques in public sector decision making will be reviewed and their respective strengths and weaknesses evaluated. Applications to a variety of public sector problem areas will be explored.

CRP 652 The Urban Development Process
Fall. 2 credits. Enrollment limited.
K. C. Parsons.
Examination of the goals, strategies, methods, and achievements of major participants in the urban land and building market: landowners, speculators, real estate brokers, developers, bankers, lawyers, nonprofit builders, and government agencies. Primarily visiting speakers.

CRP 653 Legal Aspects of Land-Use Planning
Spring. 3 credits.
Staff.
Survey of leading cases and legal concepts in land-use planning, with particular attention to zoning, subdivision control, condemnation, and growth-control issues.

CRP 660 Seminar in the History of American City Planning (also Architecture 693)
Fall. 3 credits. Prerequisite: CRP 462 or permission of instructor.
Staff.
A research seminar in which each student selects a topic for oral presentation followed by the completion of a research paper. Early sessions examine the scope of planning history, its relations to other disciplines,

sources of written and graphic materials, and the uses of historical evidence in interpreting urban planning and development.

CRP 661 Historic Preservation Planning Workshop: Plans and Programs
Fall or spring. 1–4 credits. Prerequisite: CRP 561.
Staff.
Preparation of elements of historic preservation plans, designs, legislation, and special studies. Individual or group projects are selected by students. Fieldwork is emphasized.

[CRP 662 Seminar in American Urban History (also CRP 361)
Spring. 3 credits. Prerequisite: permission of instructor. Not offered 1992–93.]

[CRP 663 Historic Preservation Law
Spring. 3 credits. Offered alternate years. Not offered 1992–93.]

CRP 664 Economics and Financing of Neighborhood Conservation and Preservation
Fall. 3 credits.
B. G. Jones.
The economic and financial aspects of historic preservation and neighborhood conservation. Topics include public finance, selected issues in urban economics, real estate economics, and private financing of real estate projects.

CRP 665 Preservation Planning and Urban Change
Fall. 3 credits.
M. A. Tomlan.
An examination of fundamental planning concepts and issues as they relate to historic preservation. Neighborhood revitalization, federal housing programs, the role of public and private institutions, displacement, and other social issues are among the primary topics.

CRP 666 Pre-Industrial Cities and Towns of North American (also CRP 360)
Fall. 3 credits. S-U grades optional.
S. Baugher.
The pre-industrial approaches to the founding, design, and development of towns and cities in North America until 1815 demonstrate how various American Indian civilizations as well as diverse European cultures have each brought their perspectives to the organization of town and city living. American Indian case studies will include Mayan and Aztec cities, the city of Cahokia, and the towns of the Pueblos, Creeks, and Iroquois. The experiences of Europeans in North America will include Spanish, French, Dutch, and English. This course is a recommended complement to CRP 361.

CRP 670 Regional Planning and Development in Developing Nations
Spring. 4 credits. Prerequisite: second-year graduate standing.
W. W. Goldsmith.
Extensive case studies of development planning are analyzed. Focus is on the political economy of the process of regional development through urbanization and in particular on the concepts of equity and efficiency, external economies, export linkages, and internal self-sufficiency and integration. Resource development, national integration, human development, and migration problems are discussed.

CRP 671 Seminar in International Planning
Spring. 1 credit. S-U grades only.
W. W. Goldsmith.
The international planning lecture series sponsors lectures by visiting scholars or professionals in the field of international development and planning. The only formal requirement for the course is a brief evaluation of the series at the end of the semester.

CRP 673 Economics of Regional Development
Fall or spring. 2 or 4 credits.
T. Vietorisz.
This course deals with the historical process of regional and metropolitan development, emphasizing Third World problems. While its basic approach is mode-of-production analysis, it also critically surveys location, comparative advantage, and feedback system theories. Development is interpreted as the penetration of the capitalist mode of production into precapitalist societies. Its features are analyzed both in terms of the historical stages of expanding capitalism (mercantile phase, imperialism, multinationals) and in terms of the pre-existing (feudal, Asiatic) precapitalist mode of production. Regional and urban development planning problems are discussed in the light of the contradictions of the above process, as well as in the context of newly emerging Third World socialist countries.

CRP 675 Seminar in Project Planning in Developing Countries
Spring. 4 credits.
D. Lewis.
An examination of the problems and issues involved in preparing project proposals for presentation to funding agencies. Topics include technical design, financial feasibility, social impact analysis, and policy relevance, as well as techniques for effective presentation of proposals. The course is organized as seminar-workshop providing both an analysis of the critical elements of effective proposals and an opportunity to use those elements in the preparation of proposals. A multidisciplinary perspective is emphasized.

CRP 703 Contemporary Theories of Regional Development
Fall or spring. 4 credits.
W. W. Goldsmith.
An advanced seminar, mainly for doctoral candidates, to review recent contributions to the literature. After a fast-paced review of basic material in political economy, students will read and present summaries of works by major contemporary theorists. A final paper is required.

CRP 711 Planning and Organization Theory
Fall. 4 credits.
P. Clavel.
Advanced seminar on theoretical models of planning, organization, and urban structure. The first part of the course, which may be taken separately for one credit, provides an overview of administrative issues affecting planning. Next, attention is given to theories of organizational structure, growth, and change. Final sessions are devoted to the influence of urban and regional structures as context. Critical reading, short papers, and seminar discussion characterize the course.

CRP 720 Quantitative Techniques for Policy Analysis and Program Management
Fall. 4 credits.
D. Lewis.
Selected analytical techniques used in the planning and evaluation of public policy and public investments are examined. Topics include simulation modeling, benefit-cost and cost-effectiveness analysis (including capital budgeting), and optimization strategies.

CRP 730 Methods of Regional Science and Planning I
Spring. Variable 3 or 4 credits.
S. Saltzman.
An introduction to some of the major methods and models used in regional science and planning. This course is half of a two-semester sequence (see CRP 731). Either course may be taken first. Both courses will cover topics related to the structure and assumptions of the models, model development, and their applications in regional science and planning. Where appropriate, computer implementation will be considered. The spring semester emphasizes statistical and econometric models.

CRP 731 Methods of Regional Science and Planning II
Fall. Variable 3 or 4 credits.
S. Saltzman.
See CRP 730. The fall semester will provide an introduction to deterministic methods and models such as input/output models, social accounting models, and optimization models.

[CRP 772 Advanced Topics on International Development and Women
Spring. 4 credits. Offered alternate years. Not offered 1992–93.]

CRP 776 Seminar in Urban Policy and Planning in Developing Countries
Spring. 3 credits.
K. C. Parsons.
The national urban development policy and planning efforts of selected developing countries are examined in the context of urbanization theory and national spatial planning. Recent descriptive and critical literature is explored. Topics include secondary cities policies, national and urban transportation planning, city planning, sites and services project planning, housing, land policy, and urban development control systems.

[CRP 777 Theories of Development and Underdevelopment
Spring. 3 credits. Not offered 1992–93.]

CRP 790 Professional Planning Colloquium I
Fall. 1 credit.
Staff.
Visiting lecturers treat problems and opportunities in the practice of planning. Topical focus to be announced. The only formal requirements for the course are attendance and a brief evaluation at the semester's end.

CRP 792 Master's Thesis, Project, or Research Paper
Fall or spring. 10 credits variable. S–U grades optional.
Hours to be arranged. Staff.

CRP 794 Planning Internships
Fall, spring, or summer. 1–12 credits.
Hours to be arranged. Staff.
Combines a professional planning internship in a metropolitan area with academic study to provide experience and understanding of the planner's role in formulating and implementing plans and policies. Salaried internships in federal or state agencies, legislative offices, and comparable settings include development of research, analysis, and other technical skills. Weekly seminars draw on student field experiences, assigned readings, and guest speakers to examine current issues of federal, urban, and regional policy from the perspective of planning practice.

CRP 795 Master's Thesis in Preservation Planning
Fall or spring. 1–6 credits.
Hours to be arranged. Staff.

CRP 796 Colloqui Journal Publication Workshop
Fall or spring. 2 credits. S-U grades only.
P. Clavel, J. Forester.
Individual and group projects culminating in the production of a professional journal.

CRP 797 Supervised Readings
Fall or spring. 4 variable credits. Limited to graduate students. Prerequisites: permission of instructor.
Staff.

CRP 798 Colloquium in Regional Science, Planning, and Policy Analysis
Fall or spring. 1 credit.
S. Saltzman.
Presentation and discussion of current research by faculty, visitors, and graduate students working on their dissertations. Typically, the colloquium will meet once a week during the semester.

CRP 800 Advanced Seminar in Urban and Regional Theory I
Fall. 3 credits. Prerequisite: CRP 500.
B. G. Jones.
The theory of urban spatial organization. Economic, technological, and social factors leading to urbanization and various kinds of spatial organizations are explored. Major theoretical contributions to the understanding of intraregional and intraurban distribution of population and economic activity are reviewed.

CRP 801 Advanced Seminar in Urban and Regional Theory II
Spring. 3 credits. Prerequisite: CRP 800.
B. G. Jones.
A continuation of City and Regional Planning 800, concentrating on recent developments.

CRP 810 Advanced Planning Theory
Fall. 3 credits. Prerequisite: CRP 500 or 710.
B. G. Jones.
A survey of the works of scholars who have contributed to current thinking about planning theory. Alternative assumptions concerning models of man and theoretical concepts concerning the nature of planning today are considered.

CRP 830 Seminar in Regional Sciences, Planning, and Policy Analysis
Fall or spring. Variable–4 credits.
S. Saltzman or W. Isard.
This seminar will provide an opportunity to review some of the literature and current research in regional science, planning, and policy analysis. Specific topics covered will vary each year. Empirical and analytical research will be emphasized. Students will be expected to prepare and present a research paper during the semester on some aspect of the topics under review.

CRP 890 Planning Research Seminar I
Fall or spring. 2 credits.
Staff.
Intended for doctoral candidates in city and regional planning; other students welcome. Presentation and discussion of current problem areas and research by advanced doctoral students, faculty members, and visitors.

CRP 892 Doctoral Dissertation
Fall or spring. 1–2 credits.
Hours to be arranged. Staff.

Special Topic Courses
Fall or spring. Variable credit.
Hours to be arranged. Staff.

Typical topics are:

CRP 609 Urban and Regional Theory

CRP 619 Planning Theory and Politics

CRP 629 Quantitative Methods and Analysis

CRP 639 Regional Development Planning

CRP 649 Social-Policy Planning

CRP 659 Urban Development Planning

CRP 669 History and Preservation

CRP 679 Planning and Developing Regions

CRP 689 Environmental Planning

CRP 699 Regional Science

CRP 719 Planning Theory and Politics

LANDSCAPE ARCHITECTURE

The Landscape Architecture Program at Cornell is jointly sponsored by the College of Agriculture and Life Sciences (in association with the Department of Floriculture and Ornamental Horticulture) and the College of Architecture, Art, and Planning.

The Program

Program faculty: M. I. Adleman, T. H. Johnson, D. W. Krall, A. S. Lieberman, L. Mirin, R. T. Trancik, P. J. Trowbridge.

The Landscape Architecture Program offers three professional degree alternatives: a two-year graduate curriculum directed to those who have undergraduate degrees in landscape architecture or architecture, a three-year graduate curriculum directed to those who have undergraduate degrees in other fields, and a four-year undergraduate curriculum. Graduate studies in landscape architecture are administered through the Graduate School and lead to a Master of Landscape Architecture degree. Undergraduate studies in landscape architecture are administered through the College of Agriculture and Life Sciences and lead to a Bachelor of Science degree.

Course Information

***LA 141 Freehand Drawing**
Fall. 3 credits.
P. Horrigan.

***LA 142 Introduction to Landscape Architecture**
Spring. 4 credits.
D. W. Krall.

***LA 201 Design, Theory, and Composition**
Fall. 6 credits.
M. I. Adelman.

***LA 202 Design, Theory, and Composition**
Spring. 6 credits.
T. H. Johnson.

***LA 301 Site Design and Detailing**
Fall. 6 credits.
P. Horrigan.

LANAR 302 Site Design and Detailing
Spring. 6 credits. Prerequisite: LA 301 with a grade of C or better. Cost of supplies, about $200; expenses for field trip, $200.
Lecs, M W F 1:25; studios, M W F 2:30–4:25. L Mirin.
This studio will engage course participants in a wide range of site-scaled projects such as subdivision developments, street improvement projects, and gardens. Projects and associated detailing will build upon knowledge gained in LA 301.

***LA 310 Site Engineering for Landscape Architects**
Fall. 4 credits.
M. I. Adleman.

***LA 312 Site Construction**
Spring. 4 credits.
P. J. Trowbridge.

***LA 401 Urban Design and Planning**
Fall. 6 credits.
R. T. Trancik.

***LA 402 Advanced Project Studio**
Spring. 6 credits.
M. I. Adleman.

***LA 410 AutoCAD**
Fall or spring. 1–4 credits; may be repeated for credit. S–U grades optional
P. J. Trowbridge.

***LA 412 Professional Practice**
Spring. 1 credit.
K. Wolf.

***LA 480 Principles of Spatial Design and Aesthetics (also CRP 481/581)**
Fall. 3 credits.
R. T. Trancik.

***LA 490 Special Topics in Landscape Architecture**
Fall or spring. 1–3 credits.
Staff.

***LA 491 Design and Plant Establishment**
Fall. 2 credits.
P. J. Trowbridge.

LANAR 497 Independent Study in Landscape Architecture
Fall or spring. 1–5 credits; may be repeated for credit. S-U grades optional.
Staff.
Work on special topics by individuals or small groups.

***LA 501 Design, Composition, and Theory**
Fall. 6 credits. Lab fee, $20; cost of basic drafting equipment and supplies, about $200.
Lecs, M W F 1:25; studios, M W F 2:30–4:25. T. H. Johnson.

***LA 502 Design, Composition, and Theory**
Spring. 6 credits.
P. Horrigan

***LA 505 Graphic Communication I**
Fall. 3 credits.
T. H. Johnson.

***LA 506 Graphic Communication II**
Spring. 3 credits.
P. Horrigan.

LANAR 520 Contemporary Issues in Landscape Architecture
Fall. 2 credits. S-U grades only.
Lec, F 11:15–1:10. L. Mirin.
Presentations on topics that are current and significant to the environmental design and planning fields. Issues are discussed from a landscape architecture point of view by practitioners and researchers representing a range of professions.

LANAR 521 History of American Landscape Architecture
Fall. 3 credits.
Lecs, T R 11:15; discs to be arranged.
L. Mirin.
Landscape architecture in the United States from Jefferson to the present is examined as a unique expression of the American experience. Influences exerted by the physical landscape, the frontier and utopian spirit, and the cultural assumptions of democracy and capitalism are traced as they affect the forms of urban parks, private and corporate estates, public housing, transportation planning, national parks, and other open-space designs.

LANAR 522 History of European Landscape Architecture
Spring. 3 credits.
Lecs, T R 11:15; discs to be arranged.
L. Mirin.
A survey from classical times to the present, emphasizing design principles and techniques that have established the landscape architecture tradition in Europe. Particular reference is made to the manner in which environments such as gardens, streets, plazas, parks, and new towns reflect in their built form a range of response to demands of culture, economics, technology, security, the law, and ecology.

***LA 590 Seminar in Landscape Architecture**
Spring. 1–3 credits; may be repeated for credit. S–U grades optional.
T. H. Johnson.

LANAR 601 Project Planning and Application
Fall. 6 credits. Limited to graduate students. Cost of supplies, about $200; expenses for field trip, $200.
Lecs, M W F 1:25; studios, M W F 2:30–4:25. Required field trip. L. Mirin.
Course participants are engaged in the analysis and design of numerous types of projects at the site scale. Projects include parks, housing projects, and commercial programs.

***LA 602 Urban Design and Planning (also CRP 555)**
Spring. 6 credits.
R. T. Trancik and staff.

***LA 610 Site Engineering for Landscape Architects**
Fall. 4 credits.
M. I. Adleman.

***LA 612 Site Construction**
Spring. 4 credits.
P. J. Trowbridge.

LANAR 650 Fieldwork or Workshop in Landscape Architecture
Fall or spring. 1–5 credits; may be repeated for credit. S-U grades optional.
L. Mirin.
Work on applied problems in landscape architecture in a field or studio setting or both.

***LA 701 Natural Systems and Planting Design Studio**
Fall. 6 credits.
P. J. Trowbridge/D. W. Krall.

LANAR 800 Master's Thesis in Landscape Architecture
Fall or spring. 9 credits.
Hours to be arranged. Staff.
Independent research under faculty guidance, leading to the development of a comprehensive and defensible design or study related to the field of landscape architecture. Work is expected to be completed in the final semester of residency.

*Offered through the College of Agriculture and Life Sciences.

FACULTY ROSTER

Baugher, Sherene, Ph.D., SUNY at Stony Brook, Visiting Prof., City and Regional Planning
Beneria, Lourdes, Ph.D., Columbia U. Prof., City and Regional Planning
Bertoia, Roberto, M.F.A., Southern Illinois U. Assoc. Prof., Art
Blum, Zevi, B.Arch., Cornell U. Assoc. Prof., Art
Booth, Richard S., J.D., George Washington U. Assoc. Prof., City and Regional Planning
Bowman, Stanley J., M.F.A., U. of New Mexico. Prof., Art
Christopherson, Susan M., Ph.D., U. of California at Berkeley. Asst. Prof., City and Regional Planning
Clavel, Pierre, Ph.D., Cornell U. Prof., City and Regional Planning
Cody, Jeffrey, Ph.D., Cornell U., Visiting Assistant Professor, City and Regional Planning
Colby, Victor E., M.F.A., Cornell U. Prof. Emeritus, Art
Crump, Ralph W., B.Arch., Cornell U. Prof. Emeritus, Architecture
Cruvellier, Mark R., M. Eng., McGill U. (Canada). Asst. Prof., Architecture
Czamanski, Stan, Ph.D., U. of Pennsylvania. Prof. Emeritus, City and Regional Planning
Daly, Norman, M.A., Ohio State U. Prof. Emeritus, Art
Drennan, Matthew P., Ph.D., New York University. Visiting Prof., City and Regional Planning
Evett, Kenneth W., M.A., Colorado Coll. Prof. Emeritus, Art
Forester, John, Ph.D., U. of California at Berkeley. Assoc. Prof., City and Regional Planning
Goehner, Werner H., Dipl. Ing., Technical U. Karlsruhe (Germany), M.Arch., Cornell U. Assoc. Prof., Architecture
Goldsmith, William W., Ph.D., Cornell U. Prof., City and Regional Planning
Greenberg, Donald P., Ph.D., Cornell U. Prof., Architecture
Hall, Roy A., M.S., Cornell U., Asst. Prof., Architecture
Hascup, George E., B.Arch., U. of California at Berkeley. Assoc. Prof., Architecture
Hodgden, Lee F., M.Arch, Massachusetts Inst. of Technology. Assoc. Prof., Architecture
Isard, Walter, Ph.D., Harvard U. Prof., City and Regional Planning
Jarzombek, Mark, Ph.D., Massachusetts Inst. of Technology. Asst. Prof., Architecture
Jones, Barclay G., Ph.D., U. of North Carolina. Prof., City and Regional Planning
Jullian de la Fuente, Guillaume, M.S. Arch., U. Catalica de Chile. Assoc. Prof., Architecture
Kelly, Burnham, M.C.P., Massachusetts Inst. of Technology. Prof. Emeritus, City and Regional Planning
Kira, Alexander, M.R.P., Cornell U. Prof., Architecture
Kord, Victor, M.F.A., Yale U. Prof., Art
Lewis, David B., Ph.D., Cornell U. Assoc. Prof., City and Regional Planning
Locey, Jean N., M.F.A., Ohio U. Assoc. Prof., Art
MacDougall, Bonnie G., Ph.D, Cornell U. Assoc. Prof., Architecture
Mackenzie, Archie B., M.Arch., U. of California at Berkeley. Assoc. Prof., Architecture
McMinn, William G., M. Arch., U. of Texas at Austin. Dean, Prof., Architecture
Meyer, Elisabeth H., M.F.A., U. of Texas. Assoc. Prof., Art
Meyers, Victoria L., M. Arch., Harvard U. Asst. Prof. Architecture
Mikus, Eleanore, M.A., U. of Denver. Assoc. Prof., Art
Miller, John C., M.Arch., Cornell U. Assoc. Prof., Architecture
Mirin, Leonard J., M.L.A., U. of Michigan. Assoc. Prof., Landscape Architecture
Mulcahy, Vincent J., M.Arch., Harvard U. Assoc. Prof., Architecture
Ochshorn, Jonathan, M. Urban Design, City College of New York. Asst. Prof., Architecture
Olpadwala, Porus, Ph.D., Cornell U. Assoc. Prof., City and Regional Planning
Otto, Christian F., Ph.D., Columbia U. Prof., Architecture
Ovaska, Arthur, M.Arch., Cornell U. Asst. Prof., Architecture
Page, Gregory, M.F.A., U. of Wisconsin. Assoc. Prof., Art
Parsons, Kermit C., M.R.P., Cornell U. Prof., City and Regional Planning
Pearman, Charles W., B.Arch., U. of Michigan. Prof., Architecture
Pendleton, Ann M., M. Arch., Princeton U., Asst. Prof., Architecture
Perlus, Barry A., M.F.A., Ohio U., Asst. Prof., Art
Poleskie, Stephen F., B.S., Wilkes Coll. Prof., Art
Reps, John W., M.R.P., Cornell U. Prof. Emeritus, City and Regional Planning
Richardson, Henry W., M.R.P., Cornell U. Assoc. Prof., Architecture
Rowe, Colin F., M.A., U. of London (England). A. D. White Prof. Emeritus

Saltzman, Sid, Ph.D., Cornell U. Prof., City and Regional Planning
Saul, Francis W., M.S., Harvard U. Assoc. Prof. Emeritus, Architecture
Schack, Mario L., M.Arch., Harvard U. Prof., Architecture
Shaw, John P., M.Arch., Massachusetts Inst. of Technology. Prof., Architecture
Simitch, Andrea, B.Arch., Cornell U. Asst. Prof., Architecture
Singer, Arnold. Prof. Emeritus, Art
Squier, Jack L., M.F.A., Cornell U. Prof., Art
Stein, Stuart W., M.C.P., Massachusetts Inst. of Technology. Prof., City and Regional Planning
Taft, W. Stanley, M.F.A, California College of Arts and Crafts, Asst. Prof., Art
Thiratrakoolchai, Sombat, D. Arch., U. of Michigan. Assoc. Prof., Architecture
Tomlan, Michael A., Ph.D, Cornell U. Asst. Prof., City and Regional Planning
Trancik, Roger T., M.L.A.-U.D., Harvard U. Prof., Landscape Architecture/City and Regional Planning
Ungers, O. Mathias, Diploma, Technical U. Karlsruhe (Germany). Prof. Emeritus, Architecture
Vietorisz, Thomas, Ph.D., Massachusetts Inst. of Technology. Adjunct Prof., City and Regional Planning
Warke, Val K., M.Arch., Harvard U. Assoc. Prof., Architecture
Wells, Jerry A., B.Arch., U. of Texas. Nathaniel and Margaret Owings Distinguished Alumni Professor of Architecture, Architecture
White, Gail S., M.F.A., Boston Museum School and Tufts U. Asst. Prof., Art
Wilder, Margaret G., Ph.D., U. of Michigan. Asst. Prof., City and Regional Planning
Woods, Mary N., Ph.D., Columbia U. Assoc. Prof., Architecture
Zissovici, John, M.Arch., Cornell U., Asst. Prof., Architecture

PROGRAM OF STUDY

Introduction

The College of Arts and Sciences at Cornell is a traditional liberal arts college. It is composed of those departments that teach and study the humanities, the basic sciences, mathematics, the social sciences, and the expressive arts. It is also a college within a university, and this wider community provides strength and diversity not available in an isolated undergraduate institution. Students may draw upon the knowledge and facilities of the other undergraduate colleges at Cornell to supplement their studies. Finally, the college is a graduate school and research center attracting faculty whose writing and research require first-rate academic facilities and whose participation in undergraduate teaching brings to their students the most current ideas in modern scholarship. It is this abundant variety that gives the college its distinctive character.

The richness of the curriculum is extraordinary; there is no course that all students must take, and there are several hundred from which they may choose. By choosing courses each semester, students design their own education. They strike a balance between developing known interests and exploring new subjects. They sharpen their verbal and quantitative skills. They also come to understand more thoroughly our common Western tradition and learn something about the non-Western world and its peoples. An education in the liberal arts means honing one's critical capacities, learning more about oneself in nature and culture, and gaining real experience of views of the world radically unlike one's own. All this is highly individual, and the college relies on each student and faculty adviser to select sensible, challenging, and appropriate courses.

Yet the faculty believe that each student's education should have certain common qualities. These include familiarity with several different ways of acquiring knowledge that are reflected in the natural sciences, in the social sciences, and in those achievements of intellect and imagination that are the focus of the humanities and the expressive arts. In addition to these general areas of knowledge, students study foreign languages, acquire effective writing skills, and concentrate on one particular field to develop, as fully as possible, the powers of imaginative and critical thinking. To accomplish these objectives, the college has certain requirements for graduation.

Summary of Basic College Requirements for Graduation

1) Freshman writing seminars: Two.
2) Foreign language: Up to four courses to obtain qualification in two languages or proficiency in one.
3) Distribution Requirement I: Four approved sequences of two full-semester courses. **Applicable through the Class of 1995**. Distribution Requirement II: See below. **Applicable starting with the Class of 1996**.
4) Major
5) Electives: Four or five courses (or 15 credits) in courses not used to fulfill other requirements and not in the major field.
6) Residence: Eight full-time semesters, unless a student can successfully complete all other requirements in fewer than eight semesters and is allowed to accelerate graduation. (See "acceleration.")
7) Minimum number of courses: Thirty-four courses. A 2-credit course counts as half a course; a 6-credit language course counts as one and one-half courses; a 1-credit course does not count toward this requirement.
8) Credits: A total of 120 credits, of which 100 must be taken in the College of Arts and Sciences.
9) Physical education: Completion of the university requirement. Please note that physical education credit does not count toward graduation or toward the 12-credit minimum required for good standing each semester. See p. 11.
10) Application to graduate.

Freshman Writing Seminars

See "John S. Knight Writing Program."

Language Requirement

The faculty considers competence in a foreign language essential for an educated person. Studying another language helps students understand language itself, our fundamental intellectual tool, and opens another culture for exploration. The sooner the student acquires competence, the more useful it will be. Hence work toward the foreign language requirement should be undertaken in the freshman and sophomore years.

The following departments teach foreign languages or literature or both in the College of Arts and Sciences: Africana Studies and Research Center, Asian Studies, Classics, German Studies, Modern Languages and Linguistics, Near Eastern Studies, Romance Studies, and Russian Literature.

The language requirement may be satisfied in one of two ways:

1) by attaining *proficiency* in one language or
2) by attaining *qualification* in two languages.

Proficiency

Proficiency is attained by passing a 200-level course (or Chinese or Japanese 161) or by equivalent achievement, to be determined by examination; see below under "Advanced Standing Credit."

Qualification

Qualification may be attained in any of the following four ways.

1) Three years of high school study in any one language gives qualification in that language. Note, however, that this route to qualification does not guarantee entrance into a 200-level course. The student who wants to continue in this language must be placed by examination.
2) Passing the requisite course: 102, 123, or 134 in languages taught by the Department of Modern Languages and Linguistics; Chinese 112–114 or Japanese 160, Japanese 141–142–241; Near Eastern Studies 102 or 122 in Hebrew, 112 in elementary classical Arabic, 214 in Egyptian Arabic, or 138 in Turkish; Classics 103 or 104 in Greek; Classics 106 or 107 or 108 in Latin; Classics 112 in modern Greek; 132 in Sanskrit; AS&RC 134 in Swahili.
3) A score of 560 or better on the Placement Test.
4) Placement in a 200-level course by special examination (in cases where no placement test is available).

A student may submit a 560 placement test score at the end of a course numbered 122, thus attaining *qualification* without taking 123. This procedure is optional: the student with a score of 560 or better may want to take 123 to be better prepared for the 200-level courses.

Note: Completion of 131–132 language course sequences does not constitute qualification.

Speakers of languages other than English may be awarded credit for their bilingual ability. Their English achievement is measured by the Test of English as a Foreign Language (TOEFL), a requirement for matriculation. Their performance in one other language learned outside the academic environment is measured by examination, and evidence of abilities in reading and writing, as well as speaking, is required. A maximum of 6 advanced placement credits is granted to students who demonstrate *proficiency* equivalent to course work at the 200 level or above at Cornell. Students may not earn credit both for proficiency in their native language and for studying English as a second language at Cornell.

Language Course Placement

Students who have had two or more years of high school study in a language may not enroll in any course in that language without being placed by examination. Nor may transfer students register without examination, even though they may have been given credit for language work elsewhere.

The type of examination depends upon the language course and the level of achievement:

1) French, German, Italian, Russian, and Spanish courses: placement test. Entering students who have not taken a standard-

ized placement test in high school and who want to continue their language study must take a placement test at Cornell during orientation week. Students may retake the language a year or more since last taking the test. Students register, and pay a fee, for the placement test in French and German, with the Academic and Career Counseling services, 203 Barnes Hall; for the placement test in Italian and Spanish, with the Department of Modern Languages and Linguistics, 203 Morrill Hall.

2) Latin (all courses except 105 and 107): departmental examination.

3) Greek (all courses except 101,104, and 111): departmental examination.

4) Arabic: departmental examination.

5) Hebrew: departmental examination.

6) Other languages: special examinations; Turkish: department examination; see the professor in charge.

7) High achievement (students with a placement test score of 650 or better in French, German, and Spanish): the Cornell Advanced Standing Examination (CASE).

An entering or continuing student with high achievement scores should take the Cornell Advanced Standing Examination (CASE); even if the student does not want to do any further work in the language, the CASE may provide proficiency status for the language requirement, and it may provide up to 6 advanced standing credits. Students who do not have high achievement scores are eligible for the courses listed in the charts below, depending on their placement test scores. For other languages, or for special problems, students should see the professor in charge.

French

Placement Test Reading Score	*Language Courses*	*Literature Courses*
Below 450	121 or 122	
450–559	123	
560–649	200, 203, or 205	
630		221
650 and above AP 4 or 5 in language	Apply for the Cornell Advanced Standing Examination (CASE)	

German

Placement Test Reading Score	*Language Courses*	*Literature Courses*
Below 450	121	
450–559	123	
560–649	203	201
650 and above AP 4 or 5 in language	Apply for the Cornell Advanced Standing Examination (CASE)	

Italian

Apply for the Cornell Advanced Standing Examination (CASE)

Russian

Apply for the Cornell Advanced Standing Examination (CASE)

Spanish

Placement Test Reading Score	*Language Courses*	*Literature Courses*
Below 450	121	
450–559	123	
560–649	203	201
	211	
650 and above AP 4 or 5 in language, 3 credits.		

Department of Modern Languages and Linguistics determines placement. Apply for the Cornell Advanced Standing Examination (CASE). AP 4 or 5 in literature, 3 credits (and proficiency). Department of Romance Studies determines placement.

Arabic

Placement by departmental examination.

Hebrew

Placement by departmental examination.

Turkish

Placement by departmental examination.

Advanced Placement Credit in Languages

Being placed in a 200-level course does not earn credit toward the degree. Credit may be granted for high school work already at the same level, in other words, for the equivalent of language courses numbered 203, 204. (In French for courses numbered 200, 203, 205, and 203.) The amount of credit is based on performance on one or more of the following examinations:

a) Advanced Placement Examination. *French, Spanish, and German:* A score of 4 or 5 yields 3 credits on the French, Spanish, or German language examinations and literature examinations. *Hebrew:* Up to 6 credits may be granted, depending on the student's score on the departmental examination. *Latin:* Consult the Department of Classics, 120 Goldwin Smith Hall. To be awarded any advanced placement credit, students must take the department's own placement examination during orientation week. A student who is permitted to register in a 300-level course on the basis of this examination will be given 6 advanced standing credits. *Ancient Greek and Modern Greek:* For information concerning advanced placement, students should consult the Department of Classics, 120 Goldwin Smith Hall.

b) Cornell Advanced Standing Examination (CASE). To be eligible for this examination the student must have achieved a score of 650 on the Placement Test. For details on registration, see "Language Course Placement and Credit," above. The maximum amount of credit is 6 credits.

c) Special examinations are given for languages where no Placement Test exists.

Earning advanced placement credit in any of the above three ways carries with it the attainment of proficiency in that language, i.e., satisfaction of the college's language requirement.

Distribution Requirement I: Applicable through the Class of 1995

The purposes of the distribution requirement are to acquaint students with a broad range of subject matter in the liberal arts and to provide them with the opportunity to explore new areas.

Accomplishing these purposes is part of the task of freshmen and sophomores. Although completion of the requirements may be spread over the eight semesters, successful introductory course work can be followed up with advanced courses only if undertaken early. For purposes of distribution, subjects are divided into four groups. Each of the first three groups has two subdivisions.

Group 1

a. Physical sciences
b. Biological sciences

Group 2

a. Social sciences
b. History

Group 3

a. Humanities
b. Expressive arts

Group 4

a. Mathematics and computer science
b. One of the subdivisions not used in fulfillment of groups 1, 2, or 3.

In each of groups 1, 2, and 3, students must take a sequence of two courses (6 or more credits) approved by the department in one subject chosen from either subdivision. For group 4, students are strongly urged to take two courses in mathematics or one in mathematics and another in Computer Science 100. Those who choose not to satisfy the group 4 requirement with mathematics must choose two courses in one subject from an unused subdivision in group 1, 2, or 3. For example, a student who fulfills group 1 with biology, group 2 with psychology, and group 3 with theatre arts could then complete group 4 with a sequence of two courses from the list below in the physical sciences, history, or the humanities.

Courses fulfilling the distribution requirement must be taken in the College of Arts and Sciences (unless noted in the list below) and may be taken for S-U grades. Students may petition to take Architecture 181–182, History of Architecture I and II, in the Department of Architecture of the College of Architecture, Art, and Planning, to fulfill the requirement in expressive arts.

Advanced Placement Credit

AP credit is meant to place students into the appropriate level of study and to give them credit for their advanced standing. AP credit counts toward the 120 credits and thirty-four course units required for graduation, as well as toward the required 100 credits in Arts and Sciences courses. The use of AP credit to satisfy distribution requirements is different for each group.

Freshman Writing Seminars. Students who score 5 on the AP exam in English are exempt from one writing seminar and are awarded three credits. A score of 4 will give three credits but no exemption from a seminar. These students, as well as those who score

700 or better on the College Placement Test in literature or composition, are eligible to enroll, space permitting, in the following freshman writing seminars: English 270, 271, 272.

Science. AP credit may be used to fulfill *half* the distribution requirement in science. Students who place out of two semesters of introductory science may satisfy the distribution requirement with one non-introductory course in that science or with an introductory sequence of two semesters in another science.

Social sciences or history. AP credit may not be used to satisfy this requirement.

Humanities or expressive arts. AP credit may not be used to satisfy this requirement.

Mathematics. AP credit may be used to fulfill the requirement in mathematics.

Here is a complete list of the courses that fulfill Distribution Requirement I.

Group 1: Physical or Biological Sciences

a. Physical Sciences

Astronomy: 101 or 211, 102 or 212, 201, 202, or any course numbered 300 or above. None of the other 100-level courses can be used to satisfy the distribution requirement for students in the College of Arts and Sciences

Chemistry: 103, 207, 211, or 215 followed by 104, 203, 208, 216, or 222.

Geological Sciences: 101, 103, or 111; plus 102, 104, or 202; or 202 plus 102 or 104.

Physics: Any two sequential courses such as 101–102, 207–208, or 112–213, or any combination of the first term of one sequence and the second term of another. The requirement is also met by any two general education courses from the group 201–206, 209, 210 or by a combination of 101, 112, or 207 with one from the group 201–206, 209, 210.

b. Biological Sciences

A two-semester introductory biology sequence selected from Biological Sciences 109–110, or 105-106, or 101/103 plus 102/104, or any combination of the first term of one sequence and the second term of another. Biological Sciences 107–108, offered during the eight-week Cornell Summer Session for 8 credits, satisfies the distribution requirement. Advanced placement in biology with a score of 4 or 5 (6 or 8 credits, respectively) satisfies half the distribution requirement in the biological sciences. The remainder of the distribution requirement may be satisfied by an upper-level course (200+) offered by the Division of Biological Sciences *(other than Bio. Sci. 200, 202, 205, 206, 208, 209, 301, or 367);* Anthropology 101; or Chemistry 222.

Group 2: Social Sciences or History

a. Social Sciences

Africana Studies: Any two of 171, 172, 190, 191, 208, 231, 280, 290, 301, 302, 344, 345, 346, 352, 400, 410, 420, 451, 460, 481, 484, 485, 495, 550, 571.

Anthropology: Any two courses in the Department of Anthropology except Anthropology 275, 371, 474.

Archaeology: Archaeology 100 and any one of the following: Archaeology 203, 204, 308, 317, 402, 404, 493, 494, or Anthropology 203, 204, 354, 355, 356, 402, 404, 456, 493, 494, 656, 663, 664, 666.

Asian Studies: Any two courses in Asian anthropology, economics, government, linguistics, or sociology given by the Department of Asian Studies or listed there under the areas of China, Japan, South Asia, and Southeast Asia, excluding only Freshman Writing Seminars and courses given outside the College of Arts and Sciences. A reasonable sequence is formed by taking any two courses in the same area, or by taking AS 208, 211, 212, 215, or 218, followed by a social science course in that area. Alternative sequences will, under special circumstances, be considered but require the permission of the director of undergraduate studies.

Economics: 101–102, 201–202, 203–204, or a combination of one of these courses and any course for which it is a prerequisite if the course is taught by a member of the Department of Economics.

Government: Any two of 111, 131, 161, 181; or any one of these courses followed by a 300-level course in the same area.

Linguistics: 101 and (1) any other course in linguistics or (2) any other course offered by the Department of Modern Languages and Linguistics for which this introductory linguistics course is a prerequisite.

Near Eastern Studies: Any two NES archaeology courses at the 200 or 300 level that form a reasonable sequence or combination. NES 197 or 198 plus an NES archaeology course will also satisfy the social sciences requirement.

Psychology: Any two courses in psychology with the exception of Psychology 123, 276, 307, 322, 324, 326, 332, 350, 361, 396, 422, 425, 429, 470, 471, 472, 473, 475, 476, 479, 491, 492, 607, 622, 625, 626, 629, 676, 696 and 722.

Sociology: Any two of 101, 103, 104, 110, 115, or 101, followed by any course at the 200 level or above in sociology.

Women's Studies: (a) Any two of 206, 208, 218, 238, 244, 277, 297, 305, 321, 336, 345, 353, 362, 363, 366, 406, 408, 425, 428, 450, 463, 466, 468, 480, 636; or (b) any one of 210, 365, 454, plus one course from list a. (Appropriate courses in women's studies taken previously may be approved by the program.)

City and Regional Planning: 100 and 101.

b. History

Africana Studies: Any two of 203, 204, 205, 283, 344, 350, 360, 361, 370, 381, 405, 460, 471, 475, 483, 490, 510.

Asian Studies: Any two courses in Asian history given by the Department of History and listed under the Department of Asian Studies under the areas of China, Japan, South Asia, and Southeast Asia, excluding only freshman writing seminars and courses given outside the College of Arts and Sciences. A reasonable sequence is formed by taking any two courses in the same area, or by taking AS 208, 211, 212, 215, or 218 followed by a history course in that area.

History: Any two courses in the Department of History.

History of Science and Technology: Any two of the following courses: History 281, 282, 286, 287, 288, 380, 447, 448, 482; also Engineering 250 and 292.

Near Eastern Studies: Any two NES history courses at the 200 or 300 level that form a reasonable sequence or combination. NES 197 or NES 198 plus an NES history course will also satisfy the history requirement.

Women's Studies: Any two of 227, 238, 273, 307, 336, 357, 426. (Appropriate courses taken previously may be approved by the program.)

Group 3: Humanities or Expressive Arts

a. Humanities

Africana Studies: Any two of 202, 211, 219, 422, 425, 431, 432, 455.

Archaeology: Archaeology 100 and any of the following: Archaeology 221, 232, 233, 250, 308, 356, 402, 423, 432; Classics 219, 220, 221, 232, 233, 239, 250, 309, 320, 322, 323, 325, 326, 327, 350, 356, 360, 423, 427, 432, 434, 435, 629, 630; Near Eastern Studies 243, 263, 264, 267, 364, 367.

Asian Studies: Any two courses in Asian art, literature, religion or cultural history given by the Department of Asian Studies or listed there under the areas of China, Japan, Korea, South Asia, and Southeast Asia, excluding only freshman writing seminars and courses given outside the College of Arts and Sciences. A reasonable sequence is formed by any two courses in the same area, or by taking AS 208, 211, 212, 215, or 218, either using two of these courses as a sequence or by following one with a course in the humanities in that area. Asian Studies 250 together with Religious Studies 101 may also satisfy the humanities requirement.

Classics: (a) any two courses in Greek beginning with 201 or in Latin beginning with 205 that form a reasonable sequence, or (b) any two of the following: Classics 206, 211, 212, 217, 218, 219, 220, 221, 222, 223, 224, 225, 232, 233, 235, 236, 237, 238, 239, 245, 250, 300, 309, 319, 320, 321, 322, 323, 326, 327, 329, 330, 331, 333, 336, 337, 339, 340, 346, 350, 356, 360, 361, 363, 366, 368, 382, 390, 391, 395, 434, 435, 480, 496.

Comparative Literature: Any two comparative literature courses through the 300 level, excluding Freshman Writing Seminars; 400-level courses with permission of the instructor or the director of undergraduate studies.

English: Any two courses in English at the 200 level or above. If students have used English courses to satisfy the expressive arts requirement, they should not take courses numbered in the 80s (e.g., 281, 382) to satisfy the humanities requirement.

French Literature: Any two courses from 200, 201, 202, 222, or 300-level literature courses.

German Literature: Any two courses at the 200 level or above.

Italian Literature: Any two literature courses at the 200 level or above.

Near Eastern Studies: Any two NES civilization or literature courses at the 200 or 300 level that form a reasonable sequence or combination, including Hebrew 201–202, Intermediate Arabic 211–212, Advanced Arabic 311–312, Intermediate Modern Hebrew 201–202, Advanced Modern Hebrew 301–302, and Intermediate Turkish 283–284. NES 197 or 198 plus an NES civilization or literature course will also satisfy the humanities requirement.

Philosophy: Any two courses with the following exceptions: (1) Philosophy 100, if used to satisfy the freshman writing seminar requirement; (2) a combination of two courses in logic, such as 131, 231, 331, 431, 432, 436.

Religious Studies: Relig. St. 101 with Asian Studies 250.

Russian Literature: Any two courses at the 200 level or above except 329, 330.

Spanish Literature: Two of 201, 315, 316, 318, or any other 300-level literature courses.

Women's Studies: (a) Any two of 248, 251, 264, 348, 349, 363, 365, 366, 374, 390, 402, 404, 445, 451, 456, 460, 474, 475, 476, 481, 491; or (b) any one of 210, 365, 493, plus one course from list a. (Appropriate courses in women's studies taken previously may be approved by the program.)

b. Expressive Arts

Africana Studies: Any two of 285, 303, 425, 430.

Anthropology: Any two of 290, 451, 452, 453, or 455.

Archaeology: Archaeology 100 and any one of the following: Archaeology 423; History of Art 220, 221, 223, 224, 320, 322, 323, 325, 326, 327, 423, 427, 432, 434.

English: Any two of the courses at the 200 level or above that are numbered in the 80s (e.g., 281, 382).

History of Art: Any two courses at the 200 level or above, or Archaeology 100 and one of the History of Art courses listed under Archaeology.

Music: 6 credits in music, except freshman writing seminars. A maximum of 4 credits in Music 321–322 and a maximum of 3 credits in Music 331 through 338 and 441 through 450 may be used to satisfy this requirement.

Theatre Arts: Any two of the 3- or 4-credit courses at the 200 level or above

Group 4: Mathematics or an Unused Subdivision

a. Mathematics and Computer Science

Any 6 credits in mathematics except 104 and not including more than one course from 105 or 403. Computer Science 100, 211, or 212 may be used for three of these credits. The mathematics distribution requirement is also satisfied by a score of 3 or higher on the CEEB calculus BC examination. Mathematics 109 and Education 005 and 115 (College of Agriculture and Life Sciences) *do not count toward satisfying the requirement.*

b. An Unused Subdivision

A sequence of courses in any one of the subdivisions in groups 1–3 that has not been used to fill that group's requirement.

Distribution Requirement II: Beginning with students in the Class of 1996

In satisfying the distribution requirements, students become acquainted with a broad range of subject matter in the liberal arts and sciences and explore areas they may not have explored before.

Attaining these two goals is part of the task of freshmen and sophomores. Although students may complete the requirements over the eight semesters, they can follow up introductory and exploratory course work that proves intriguing with advanced courses only if they have taken the introductory courses early.

Students must take a total of nine courses for the distribution requirement: four courses (of three or more credits each) from Groups 1 and 2 below, at least one of which is from Group 2, and at least two of which are from Group 1; five courses from Groups 3 and 4 below, with at least two in each group and two in the same department. No single course may satisfy more than one distribution requirement, and no freshman writing seminar may satisfy any of the distribution requirements.

1. Physical and Biological Sciences

Astronomy 101 or 211, 102 or 212, 201, 202 or any course numbered 300 or above

Chemistry (all courses)

Geological Sciences (all courses)

Physics (all courses)

Biological Sciences 201, 207, 212, 246, 275, or a two-semester sequence of introductory biology (101/2–103/4, 105–106, 107–108, and 109–110).

Please note that the introductory sequences can only be counted in their entirety, i.e., only upon satisfactory completion of both semesters of one sequence or the first semester of one and the second semester of another. (The following courses may *not* be used to satisfy the distribution requirement in science: 200, 202, 205, 206, 208, 209, 301, 367)

2. Quantitative and formal reasoning

All courses offered by the Department of Mathematics *except* Math 101 and 109

City and Regional Planning 320

Computer Science 100, 101, 172, 211, 212

Industrial & Labor Relations 210, 211

Linguistics 316

Operations Research & Industrial Engineering 115

Philosophy 231, 331, 431, 436

Physics 205

Psychology 350

Sociology 301

Statistics and Biometry 215

If students choose two courses from this list to satisfy part of the distribution requirement, those two courses may not have significant overlap. For example, students should not choose two beginning courses in statistics.

Advanced placement or transfer credit only in mathematics or computer science may be applied to the distribution in quantitative and formal reasoning.

Under exceptional circumstances and upon petition, certain Cornell courses not listed above under Group 2, courses such as those appearing on the following auxiliary list, may be used to satisfy the requirement in quantitative and formal reasoning. The petition should provide persuasive rationale both in terms of the student's course of study and in terms of meeting the goals of the requirement.

Auxiliary list: Agricultural Economics 310; Agricultural Engineering 151; City and Regional Planning 321; Industrial and Labor Relations 312; Linguistics 421, 450; Psychology 472–473 (a sequence of two two-credit courses which may count only in its entirety as one course); Sociology 420

3. Social sciences and history

Africana Studies 171, 172, 190, 191, 231, 280, 290, 301, 302, 344, 345, 346, 352, 382, 400, 410, 420, 451, 460, 481, 484, 485, 495, 550, 571

Anthropology (all courses except Anthropology 101, 275, 371, 474)

Archaeology 100, 201, 203, 204, 308, 317, 402, 404, 493, 494

Asian studies (courses in Asian anthropology, economics, government, linguistics, or sociology)

City and Regional Planning 100, 101

Economics (all courses except 317, 318, 319)

Government (all courses)

Linguistics (all courses)

Near Eastern archaeology

Psychology (all courses except 123, 276, 307, 322, 324, 326, 332, 350, 361, 396, 422, 425, 429, 470, 471, 472, 473, 475, 476, 479, 491, 492)

Sociology (all courses)

Women's Studies 210, 220, 218, 238, 244, 277, 281, 297, 305, 321, 353, 362, 365, 366, 372, 406, 408, 425, 428, 438, 450, 454, 463, 468, 479, 480, 493

History

Africana Studies 204, 205, 283, 344, 350, 360, 361, 370, 381, 405, 460, 471, 475, 483, 490, 510

Engineering 250, 292

History (all courses)

Near Eastern Studies 197, 198, and other courses in Near Eastern history

Women's Studies 227, 238, 273, 307, 336, 357, 426

4. Humanities and the arts

Africana Studies 202, 211, 219, 422, 425, 431, 432, 455

Archaeology 221, 232, 233, 250, 308, 356, 360, 402, 423, 432

Asian Studies (courses in Asian art, literature, religion, or cultural history)

Classics

Comparative Literature

English

French Literature

German Literature

Italian Literature

Near Eastern Studies (courses in Near Eastern civilization or literature, including languages courses at the 200-level or above)

Philosophy (all courses except courses in logic)

Religious Studies 101

Russian Literature

Spanish Literature

Africana Studies 285, 303, 425, 430

Anthropology 290, 451, 452, 453, 455

Archaeology 423

History of Art

Music (a maximum of 4 credits in Music 321–322 and a maximum of 3 credits in Music 331 through 338 and 441 through 450)

Theatre Arts (except for technical theater courses)

Students may apply up to two courses of approved advanced placement credit in calculus, computer science, and science toward satisfaction of the distribution requirement in Groups 1 and 2 above, provided that they complete at least one science course during their undergraduate career. They may apply no advanced placement credit toward satisfaction of the distribution requirement in Groups 3 and 4. Grades of S–U in courses applied to the distribution requirement are acceptable.

Breadth Requirements

Students must include in their undergraduate curricula at least one course that focuses on an area or a people other than those of the United States, Canada, or Europe, and one course in an historical period before the twentieth century. (Courses focusing on Native American cultures may count toward the breadth requirement.) Courses that satisfy the first breadth requirement, geographical breadth, are marked with a @ when described in this catalogue. Courses that satisfy the second, historical breadth, are marked with a #. Many courses satisfy both requirements, and students may in fact use the same course to satisfy both. They may also apply proficiency in a non-Western language toward the geographical breadth requirement and use courses satisfying distribution, major, or elective (but not writing) requirements in satisfaction of either of the breadth requirements. Advanced placement credit may not be applied to either of the breadth requirements.

The Major

In their last two years, students devote roughly one-half their time to acquiring depth and competence in a major subject. The choice of major is not intended to define a student's education or to lead to a lifetime's occupation, although it may do so. By majoring, students focus the full extent of their imaginative and intellectual capacities on something they care about, and sharpen their minds in the process.

Sophomores must be accepted by departments as majors before registering for courses for the junior year. Most departments and programs specify certain prerequisites for admission to the major; students should consult the departmental listings on the following pages. A department may refuse to accept into the major any student whose performance does not meet departmental standards. To seek admission into a major, students take a copy of their transcript to an appointment with the director of undergraduate studies in their prospective major department.

Available majors. Majors are offered by each of the departments. There are also majors in Africana studies, American studies, archaeology, biology and society, dance, German studies, Russian/Soviet and East European studies, and science and technology studies.

Some students want to pursue an interest that cannot be met within an established major. They may plan, with the help of their faculty adviser, an independent major that includes courses from several departments. See "Independent Major Program," below, under "Special Academic Options."

Students are responsible for completing their majors according to the regulations of their departments. Courses that fulfill major requirements may not be taken for S-U grades.

Electives

Of the thirty-four courses and 120 credits required for graduation, almost one-third are free electives. How students use these electives frequently makes the difference between an ordinary and a truly interesting curriculum. Students must complete four or five courses or at least 15 credits in courses that are offered outside the major field and are not used to fill another requirement. Students may group electives to form a concentration within one discipline or to cover a topic across several disciplines. Some choose to explore a variety of subjects. Electives taken in other divisions of the university may be used to gain practical training or specialized knowledge. Some students develop a concentration in one particular department or subject outside arts and sciences.

Residence

Earning a Bachelor of Arts degree from the College of Arts and Sciences normally takes eight semesters of full-time study. Even if the minimum requirements can be met in fewer semesters, the college expects that students will study full-time for eight semesters to take maximum advantage of the resources of the university and obtain a rich liberal arts education. A full semester in an approved program of study abroad, a college fieldwork program, the SEA Semester, or Cornell-in-Washington, all of which the college encourages, is considered a semester of residence at Cornell.

Students occasionally enter with advanced placement credit from other institutions (this does not include advanced placement credit from the Placement Test Program, for which regular Cornell credit is granted), take leaves and complete courses at other institutions, or take summer courses at other institutions. The college will accept up to 20 credits from other institutions as part of the out-of-college electives if the appropriate departments at Cornell approve. (This excepts, of course, approved study abroad and in absentia programs, for which up to 30 credits will be accepted, and credits earned by transfer students at their first university.) However, credits earned at other institutions do not replace any of the eight semesters of residence and may not normally be substituted for the final two semesters. Nor may students leave the college after three or three and a half years and complete their degrees with credits earned at other institutions or through the Cornell extramural division and summer session. Students are not allowed to be part-time students during their eight regular semesters unless they meet the criteria described in the section "Part-Time Study and Pro Rata Tuition" or present convincing academic or medical reasons for part-time study. Semesters as part-time students in the extramural division do not count as semesters of residence.

Acceleration. Less than 10 percent of the students in the college graduate in fewer than eight semesters. All accelerants are required to spend a minimum of *six* regular (i.e., full-time spring or fall) semesters at Cornell University, except external transfers, who are required to spend a minimum of *four* regular semesters at Cornell. All accelerants are expected to be students in Cornell's College of Arts and Sciences for at least *four* regular semesters.

1. Accelerants must meet either condition *a* or *b*:
   a. To complete the degree in *seven* semesters, students must have finished *sixty* credits by the end of the *third* semester. To complete the degree in *six* semesters, students must have finished *sixty* credits by the end of the *second* semester. Students must have completed the prerequisites for admission to the major in time to spend *four* semesters in the major.
   b. To complete the degree in fewer than eight semesters, students must have passed 48 credits in Cornell courses numbered "300" and above. Courses taken at Cornell University, Cornell-in-Washington, the SEA semester, college fieldwork programs, or an approved program of study abroad are considered Cornell courses, although all courses not taught in Ithaca in the College of Arts and Sciences are subject to review.
2. All accelerants are required to complete 100 credits at C or above.
3. Students may not use credits earned while on required leave of absence to reduce their terms of residence.
4. Accelerants may not finish the degree with credits earned in summer or winter session, through part-time study (unless they meet the guidelines for part-time study), or at another institution. That is, they may not exit through any program other than a regular, full-time Cornell semester.

Students planning to accelerate should obtain and present petitions during their junior year to the Office of Records and Scheduling, M46 Goldwin Smith Hall.

Ninth term. Students may spend a ninth term in residence. They should discuss their program with the assistant dean for seniors and must notify the college in writing of their intention. Students receiving financial aid should discuss funding with an adviser in the Office of Financial Aid.

Minimum Number of Courses and Credits

Students must complete at least thirty-four courses to graduate, that is, four courses during each of six semesters and five courses during each of two semesters. A 3- or 4-credit course counts as one course; a 2-credit course counts as one-half course. Single-credit courses do not count as part of the thirty-four except in certain cases when they form a part of a series (certain offerings in biology, music, and theatre arts for instance) and two in the same series can be aggregated to count as one-half course. A 6-credit language course counts as 1 1/2 courses, while the summer Falcon Programs in Asian languages count as 10 credits and 2 1/2 courses each. Biology 364, for 6 credits, and most other 5- or 6-credit courses count as one course.

Students must also complete 120 credits, 100 of which must be from courses taken in the College of Arts and Sciences, to earn the Bachelor of Arts degree. Credits earned from advanced placement examinations, courses approved for study abroad, and courses taken in certain off-campus residential programs may be counted towards the 100 credits required within the college and also toward the required thirty-four courses. Credits earned in other colleges at Cornell, or in any subject at U.S. institutions other than Cornell, do not count as part of the 100. The only exception is for courses (usually no more than three) that a department accepts from other colleges at Cornell as fulfulling major requirements.

Application to Graduate

In the first semester of their senior year, students must complete an application to graduate so that the college can check each student's plan for fulfilling college requirements. This process is intended to help seniors plan to complete college requirements and help them identify problems early enough in the final year to make any necessary changes in course selection to satisfy those requirements. *Meeting graduation requirements is the student's responsibility;* problems that are discovered, even late in the final term, must be resolved before the degree can be granted. Seniors will receive applications and instructions with their preregistration materials for the final semester.

Degree Dates. There are three degree dates in the year: May, August, and January. Students who plan to graduate in August or January are expected to attend the graduation ceremonies *in the following May*.

The Degree: The College of Arts and Sciences grants the A.B. (or B.A.) degree. A.B. is the abbreviation of the Latin name for the degree: "Artium Baccalarius," or translated into English, B.A.: "Bachelor of Arts."

Courses, Credit, and College Requirements

A course may not be used to fulfill more than one college requirement, with the following exceptions.

1) A course may be used to fulfill a distribution requirement and also a major requirement, provided that the major adviser agrees.
2) A one-semester course in foreign literature that is acceptable for achieving proficiency in that language may also be used as a partial fulfillment of the distribution requirement in the humanities.
3) Students whose native language is not English and who take English 211–212, may fulfill both the freshman writing seminar requirement and the appropriate distribution requirement by taking two freshman writing seminars offered in English, history, history of art, classics, philosophy, romance studies, Russian literature, German literature, or comparative literature.
4) Courses used to fulfill college requirements (but not major requirements) may be taken for S-U grades.

Repeating courses. Students may repeat courses. If the instructor certifies that the course content has been changed, credit will be granted a second time. If the content has not changed, both grades will appear on the transcript and will be included in any average that is calculated, but credit will be counted toward the degree only once. Students who plan to repeat a course should submit a petition to the Office of Records and Scheduling, M46 Goldwin Smith Hall.

Attendance in classes is a matter between students and their instructors. If a student cannot attend classes because of illness or family crisis, the Academic Advising Center will notify instructors when requested to do so, but students must arrange for making up examinations or other work with their instructors. When students will be absent because of religious holidays or athletic competitions, they must discuss arrangements for making up their work with their instructors. Students who must miss an examination should be sure to contact the professor in advance. Alternative arrangements are at the discretion of the instructor.

Transferring credit. The college evaluates credit received from either another school or college at Cornell University or another accredited institution of collegiate rank to determine the number of credits and courses the student may apply toward the Bachelor of Arts degree. Tentative credit evaluations are normally provided to external transfers at the time of the notification of their admission. No more than 20 credits in courses not commonly given by the College of Arts and Sciences may be applied toward the degree.

Transfer students must successfully complete at least 60 credits and sixteen courses at Cornell; they must be in residence for four regular semesters. Summer session does not count toward the residence requirement. Advanced placement credit awarded by other colleges, either at Cornell or elsewhere, will be re-evaluated by the college and may not be accepted.

Advanced placement credit. See p. 5.

Summer session credit. A student may earn credit toward the degree by completing courses in Cornell's summer session or by petitioning to take courses at other colleges. Students should consult their advisers regarding summer study plans.

Credit for summer courses not taken at Cornell must be approved by the appropriate Cornell department. The college Office of Records and Scheduling, M46 Goldwin Smith Hall, can supply approval forms and information. Credit earned in summer courses other than those at Cornell will not count toward the 100 credits required in the college, including summer programs that prepare for a regular semester abroad. Three credits may be earned in such pre-session summers abroad, which are counted as out-of-college credit. Transcripts from other institutions should be sent to the Office of Records and Scheduling, M46 Goldwin Smith Hall.

Entering students who want to receive credit toward the degree for courses completed in a summer session away from Cornell should have transcripts sent to the Office of Records and Scheduling, M46 Goldwin Smith Hall, during the summer before matriculation. Credits completed in Cornell summer sessions will be given automatically.

Summer session at Cornell or elsewhere does not count toward the eight-semester residence requirement.

Non-credit courses. The college does not grant credit toward the degree for every course offered by the university. Courses in remedial or developmental reading (for instance, Human Ecology 100) and supplemental science and mathematics courses offered by the Learning Skills Center, carry credits that are counted toward good standing in a given semester but not toward graduation. Physical education, typing, shorthand, and military training courses are among those for which credit is not given. Faculty legislation strictly prohibits granting credit toward the degree for service as an undergraduate teaching assistant, even though the department may record credit for such service on the transcript.

Auditing. The college encourages its students to take advantage of its rich curriculum by sitting in on courses that interest them but do not fit into their schedules for credit. As long as the instructor agrees, students are welcome to visit courses. Small seminars and language courses are sometimes not open to visitors. Audited courses do not, of course, appear on the student's schedule or transcript.

Physical Education

See "University Requirements for Graduation," p. 11. The college does not count physical education credit toward the 120 credits required for graduation, nor does physical education credit count toward the twelve credits required for good standing each semester.

SPECIAL ACADEMIC OPTIONS

Degree Programs

The following programs allow students to work toward more than one degree or to alter the regular college requirements or departmental requirements for the major.

Independent Major Program

The Independent Major Program allows students to design their own interdisciplinary majors if they want to pursue an interest that cannot be met within an established major. Proposals for an independent major must be supported by a faculty adviser and are assessed by a board of faculty members. Board members consider whether the plan is equivalent in coherence, breadth, and depth to a departmental major, whether it is well suited to the student's academic preparation, and whether it provides a liberal education. Independent majors substitute for established majors, but students must still satisfy all the other requirements for the baccalaureate degree. Students should contact the director of the Independent Major Program, Academic Advising Center, 55 Goldwin Smith Hall, for further information. Deadlines for submitting independent major proposals are listed on the calendar supplement for the College of Arts and Sciences.

College Scholar Program

The College Scholar Program frees no more than forty students in each freshman class from the usual college requirements for a degree and allows them to design their own academic programs. It is meant to serve students whose interests and talents do not easily fit into the usual departmental majors, who demonstrate exceptional promise, and who show the maturity to plan and carry out, with the help of their adviser, a well-designed program of studies. College Scholars do not all design the same kind of program: Some, for instance, pursue diverse interests, while others integrate a variety of courses with a common theme.

College Scholars must complete 120 credits of course work (100 in the college), 34 courses, and, unless they receive special permission from the program to accelerate, eight full terms of undergraduate study. They must complete the physical education requirement. All College Scholars must complete a senior project. They are not required to complete or fulfill the distribution requirements, although members of the College Scholar Advisory Board believe that the spirit of the requirement is a good one.

Each applicant to the College Scholar Program is asked to write an essay, which is due the last Wednesday in April of the freshman year. Mid-year freshmen apply at the end of their first spring semester in the college. Students should contact the Academic Advising Center, 55 Goldwin Smith Hall, for further information.

Double Majors

A student may complete a double major by fulfilling the major requirements in any two departments of the college. No special permission or procedure is required. Students need, however, to become accepted into both majors and be assigned an adviser in each department. Both majors will be posted on the official transcript.

Dual Degree Programs with Other Colleges

Ambitious and diligent students who want both a liberal arts education and professional training may earn both a Bachelor of Arts degree from the College of Arts and Sciences and (1) a Bachelor of Science degree from the College of Engineering or (2) a Bachelor of Fine Arts degree from the Department of Art in the College of Architecture, Art, and Planning or (3) a Bachelor of Science degree in urban and regional studies from the Department of City and Regional Planning in the College of Architecture, Art, and Planning or (4) a Bachelor of Science degree in architectural history from the College of Architecture, Art, and Planning. Dual Degree Programs ordinarily take five years to complete. Students enter one of these colleges as freshmen and begin the dual degree program with the second college in the second or, in some cases, the third year. For further information students should contact associate director Saraydar, Arts and Sciences Admissions, 172 Goldwin Smith Hall.

Double Registration with Professional Schools

Registration in the senior year of the College of Arts and Sciences and the first year of Cornell Law School or Cornell Medical College, or the Johnson Graduate School of Management, is possible. A few exceptionally well-prepared students who have earned 105 credits before the start of the senior year and have been accepted by one of the above-named professional schools may be permitted to register simultaneously in the college and in one or another of these professional schools during the seventh and eighth terms.

Students interested in the joint program with the Law School or the Graduate School of Management should see the assistant dean for the senior class, Academic Advising Center, 55 Goldwin Smith Hall.

Students registering simultaneously in the college and in the Cornell Medical College receive the Bachelor of Arts degree after the first year of medical studies and the Doctor of Medicine degree after the remaining three years of medical college are completed. Interested students should contact Jane Crawford, health careers coordinator, 203 Barnes Hall.

Double-registered students must, of course, complete all requirements for the B.A. degree, including 100 credits in College of Arts and Sciences courses.

Teacher Education in Science and Mathematics

Students at Cornell may pursue teaching credentials in biology, chemistry, earth science, general science, mathematics, and physics. Teacher Education in Science and Mathematics (TESM) is a university program jointly conducted by the department of education and mathematics. Although TESM offers options for undergraduate and graduate study, most students enroll in a five-year program, which combines an undergraduate major in mathematics or one of the sciences with a one-year Master of Arts in Teaching degree (MAT). Students from any college at Cornell are eligible to apply to the program as undergraduates, usually during their sophomore year.

For more information, contact the TESM student support specialist at 255–9255 or the program coordinator, D. Trumbull, 255–3108.

Special-Interest Options

The following options do not alter the college's requirements but enable students to pursue special interests within the usual program. Independent course work is involved in independent study and in the Undergraduate Research Program; premedical and prelaw counseling help students make appropriate use of the regular curriculum.

Independent Study

Independent study affords students the opportunity to pursue special interests not treated in regularly scheduled courses. A faculty member, who becomes the student's instructor for the course, must approve the student's program of study and agree to provide continuing supervision of the work. Students must prepare a proposal for independent study. Consult the Office of Records and Scheduling, M46 Goldwin Smith Hall, for information. In one semester students may earn up to 6 credits with one instructor or up to 8 credits with more than one instructor.

Undergraduate Research Program

The Undergraduate Research Program enables students to gain firsthand experience in scholarly research by participating in a faculty member's research project. Participation is recognized by course credit, since the program emphasizes what students will learn rather than what they will contribute to the project. However, students sometimes make contributions of a very high order and publish the results of their work.

Besides learning research methods that are appropriate to the discipline, students gain awareness of their own research interests and abilities, self-discipline, new insight into the subject matter, and the pleasure of working as scholar-apprentices with professors and other students who share a common interest.

Students interested in this program should see assistant dean Williams, Academic Advising Center, 55 Goldwin Smith Hall.

Language Study

More than forty languages are taught in the College of Arts and Sciences; some of them are available only at Cornell. A full range of language, literature, and cultural courses are available in most of the major ancient and modern languages through the joint efforts of the Department of Modern Languages and Linguistics and the departments that specialize in literary and cultural study: the Africana Studies and Research Center and the departments of Asian Studies, Classics, German Studies, Near Eastern Studies, Romance Studies, and Russian Literature. Semi-intensive courses afford students the option of accelerating the development of language skills.

FALCON Program (Full-Year Asian Language Concentration). FALCON allows students who are interested in the Far East to study Chinese, Japanese, or Indonesian exclusively for one year. They gain proficiency in the language and familiarity with the culture. Students who are interested in the Far East should be aware of the opportunities here to pursue rapid and thorough beginning studies on campus with the objective of studying abroad later—in China, Japan, or Southeast Asia.

Language House Program (136 Goldwin Smith Hall)

Beatrice B. Szekely, academic administrator

A complement to classroom cultural and linguistic instruction, the Language House Program combines residential and academic opportunities for developing and practicing conversational skills in French, German, Italian, Russian, Spanish, and Mandarin Chinese. It helps prepare students who plan to study abroad and helps returning students share their cultural experiences while further increasing their language skills.

Prelaw Study

Law schools neither require nor prefer any particular program of study; they do seek students with sound training in the liberal arts. It is important that students plan a program in which they are interested and do well. Beyond that, students are advised to take courses that will develop the powers of precise, analytical thinking and proficiency in writing and speaking.

The college offers a concentration in law and society. Students should work towards completion of this concentration because they are interested, not because they believe it will convince law schools of their interest.

The adviser for students in the College of Arts and Sciences who are applying to law school is assistant dean Buettner, Academic Advising Center, 55 Goldwin Smith Hall.

Premedical Study

The breadth and depth afforded by a liberal arts education are invaluable for people who plan medical careers, whether they intend to practice or go into medical research. Such training has a profound effect on the doctor's usefulness to patients, and it affords the flexibility of mind that is needed for major research undertakings. Medical and dental schools do not prescribe or even prefer a particular major; they do, however, require particular undergraduate courses. Students who are interested in medical careers are urged to visit the Health Careers Office, 203 Barnes Hall.

The adviser for students in the College of Arts and Sciences who are planning careers in medicine is assistant dean Turner, Academic Advising Center, 55 Goldwin Smith Hall.

Off-Campus Programs

Many students find it important to their majors or to their overall academic programs to study off campus or abroad for one or two semesters. When it makes academic sense, the college encourages its students to pursue such studies and grants credit toward the degree for work satisfactorily completed.

Study Abroad

In 1991–92, 267 students in the college studied abroad. Cornell has established affiliations with universities and programs in Africa, Australia, Belgium, Britain, China, Denmark, Egypt, Indonesia, Israel, and Sweden, as well as its own programs in France, Germany, Italy, Japan, Russia, Spain, and Switzerland. Students have studied in those countries and in others all over the world. Before planning a program for study abroad, students should consult the Cornell Abroad Office, 474 Uris Hall, for information regarding programs and procedures. For college approval of study-abroad applications, students should see the appropriate dean in the Academic Advising Center, 55 Goldwin Smith Hall.

A request to study abroad must have the support of the faculty adviser and the college. A maximum of 30 credits for a year or 15 credits for a semester may be earned abroad. These credits may count as part of the 100 credits required within the College of Arts and Sciences. On returning, students must seek approval of the courses completed abroad from the appropriate departments. Normally, transfer students entering as juniors will not be allowed to study away from Cornell.

Students studying abroad must be in good academic standing the semester prior to departure. No more than two semesters abroad are allowed.

Seniors who wish to study abroad during their *final semester* must petition the college for permission to do so, but such permission is only rarely granted.

Summer Residential Programs in Archaeology

During the summer months students may participate in a Cornell-sponsored archaeological project. In recent years the program has organized archaeological projects in New York State, Central America, South America, and the Mediterranean region. Students should contact the Archaeology Program for information about the sites available this summer.

Marine Science

Shoals Marine Laboratory is a seasonal field station that offers a variety of courses and experiences designed to introduce undergraduates to the marine sciences. The laboratory is located on Appledore Island, six miles off the Maine and New Hampshire coasts. Students should contact the Division of Biological Sciences for further information.

Cornell-in-Washington

The Cornell-in-Washington program enables a limited number of advanced students to study questions of public policy and to do supervised research during a term of residence in the capital. Students choose among several seminars. They become familiar with the various sources of information and develop research techniques. The program also offers a unique internship program: students serve as interns in a federal agency or congressional office and take part in a public-policy seminar. They define and carry out individual research projects that explore the connections between abstract policy issues and the day-to-day activities of the office. Potential internships are arranged through, and approved by, the Cornell-in-Washington program. Students are admitted to the Cornell-in-Washington program by the Department of Government. For further information, see p. 19 or inquire at 134 McGraw Hall.

Fieldwork

Sometimes it is appropriate for students to include fieldwork as part of their major. A three-member faculty committee helps the student plan the project, arranges for ongoing supervision, and evaluates the project at the end of the term. Fieldwork almost always involves writing a long paper or several short ones, as well as practical experience. All proposals for fieldwork must be presented in advance to the Academic Records Committee for approval. A maximum of 15 credits in fieldwork may be earned. For further information students should contact the Academic Advising Center, 55 Goldwin Smith Hall.

ADVISING

The following advisers and offices provide information on college procedures and regulations, academic advising, or counseling.

Faculty Advisers

All students are assigned a faculty adviser. The adviser helps students design programs of study and advises them about ways to achieve their academic goals. Advisers and new advisees meet first during orientation week to plan the student's program. New students are encouraged to see their advisers again early in the term, before it is too late to drop courses, to discuss their academic program and to become better acquainted. Academic difficulties may frequently be solved or avoided if students and advisers recognize problems early. Advisers and advisees meet at least once each semester to discuss courses for the following term.

Students who would like to petition for an exception to college rules should discuss the matter with their advisers.

Advisers may also help students with study or personal problems or may direct them to other offices on campus where help is available.

Student Advisers

Each new student is also assigned a student adviser who can provide information about the college's requirements, courses and instructors and about life at Cornell.

Major Advisers

After acceptance into a major program, students are assigned a major adviser, a faculty member in the major department, with whom they make many of their most important academic decisions at Cornell. The adviser eventually certifies the completion of the major. The major adviser should be consulted by the student about all academic plans, including honors, study abroad, acceleration, and graduate study. The adviser's support is especially important if a student petitions for an exception to the requirements for the degree.

Academic Advising Center

The Academic Advising Center, 55 Goldwin Smith Hall, serves as a resource for faculty and student advisers and for students themselves and their parents. The assistant deans (one for each class, one for minority students, and one for special programs) are available to help students define their academic and career goals and to help with special academic options such as study abroad, undergraduate research, independent majors, and exceptions to college rules.

REGISTRATION AND COURSE SCHEDULING

Registration with the University

All students must register with the university at the beginning of each semester. Students may register if they are academically eligible and have paid their tuition. Registration materials are available at a time and place announced each term by the Office of the University Registrar.

Enrollment in Courses in the College of Arts and Sciences

Students must enroll in courses through the Office of Records and Scheduling in the college, M46 Goldwin Smith Hall.

New Students

The Academic Advising Center conducts briefings during orientation week for incoming freshmen and transfer students about procedures for scheduling courses.

Continuing Students

Continuing students are expected to select and schedule courses in advance during the previous term. Students who fail to sign into courses during the designated period must wait until the beginning of the semester and may have difficulty securing places in the courses they most want. Students may schedule up to five courses during the course enrollment (pre-registration) period. Information and materials will be available in the Records and Scheduling Office, M46 Goldwin Smith Hall. Before signing into courses, students should make appointments with their faculty advisers to plan their programs. Course enrollment (pre-registration) is the best time to discuss long-range goals with faculty advisers. Students who do not have majors must submit an academic plan, approved by their faculty adviser, with their proposed schedule. Student advisers will also assist students. All students are welcome to discuss programs and plans with an assistant dean in the Academic Advising Center, 55 Goldwin Smith Hall.

The Records and Scheduling Office issues a supplement to *Courses of Study* showing last-minute changes in courses; the supplements of other divisions of the university are also available for reference in the Office of Records and Scheduling. Continuing students receive their course schedules at university registration. In the fall they also receive a copy of their transcript and a record of their progress toward the degree, which shows the courses taken, grades received, graduation requirements fulfilled, and academic actions. These are not official transcripts, but they reflect the official record and should be corrected in the Records and Scheduling Office if they are incorrect.

Limits on Courses and Credits

To meet the 34-course requirement, students must normally take four courses during each of six semesters and five courses during each of two semesters. To meet the 120-credit requirement, students should average 15 credits per semester. (AP credit and/or summer credits may reduce these numbers.) At a minimum, students must carry twelve credits per semester; if for compelling personal or academic reasons students need to carry fewer than twelve credits, they should consult their faculty adviser and the assistant dean of their class. Permission is by petition only. Completion of fewer than twelve credits without permission results in unsatisfactory academic standing. First-term freshmen may not register for more than eighteen credits; other students may register for more than eighteen credits a term only if their previous term's average was a B or higher. No more than twenty-two credits may be taken in a regular semester without permission of the Committee on Academic Records. Students who fail to seek approval for excess credits from the committee run the risk of having only 18 credits for the semester count toward the degree.

Any student who is not officially enrolled in a schedule of courses by the end of the third week of classes may be withdrawn from the college.

Forgery on Forms

Forging signatures or credentials on college forms is an academic offense; sometimes it constitutes academic fraud. In all cases of forgery on academic forms, the effect of the forged documents shall be negated. Students may then petition properly to do whatever they attempted to do improperly. Such incidents will be recorded in the Academic Integrity Hearing Board confidential file for forgeries. If a student forges more than once or if the forgery would advance the student's academic standing unfairly or fraudulently or if, for any other reason, the situation requires some other response in addition to the uniform penalty, the Academic Integrity Hearing Board might make a different recommendation, such as a notation on the student's transcript, suspension, or dismissal.

Special Registration Options

Adding and Dropping Courses

After course enrollment (pre-registration), students may not add or drop courses until the new term begins. All program changes must be approved by the department and also by the faculty adviser (for juniors and seniors only). During the first three weeks of the semester, course changes may be made without petition. Add/drop forms are available in the Records and Scheduling Office, M46 Goldwin Smith Hall.

After the third week of classes courses may be added, and after the seventh week courses may be dropped, *only* by petition. Students may withdraw from courses between the eighth and twelfth weeks of the term *only* if (1) the instructor certifies the student has worked hard to master the material and has completed assigned work and taken exams, (2) the instructor approves, and (3) no issue of academic integrity is at stake. Students who want to withdraw from a course after the seventh week of the term must meet with an assistant dean and submit a petition by the end of the twelfth week of the semester. The records of students whose course loads drop below 12 credits will be reviewed at the end of the semester.

Courses dropped after the seventh week will be noted on the transcript by a "W" where the grade would normally appear. No petitions to withdraw from courses may be submitted after the end of the twelfth week in the term. Deadlines for short courses will be adjusted according to the length of the courses. After the midpoint of a short course, students who wish to add or drop the course must petition to do so.

Leaves of Absence

Taking time off from college to think about goals and progress, to gain additional experiences or funds, or just to take a break from studying is sometimes useful to students. Those in good standing who take a leave by the end of the eighth week of the semester are welcome to register in the college the following semester. Five years is the maximum length of time a student may be on leave and return without special permission. Leaves of absence are of four types.

1) *Personal leaves* impose no conditions concerning the right to reenter the college except for the five-year limit. Readmission is automatic upon written request made at least one month before the beginning of the term in which the student wishes to return.
2) *Medical leaves* are granted by the college only on recommendation by a physician from Gannett Health Center. Such leaves are granted for at least six months and up to five years with the understanding that the student may return at the beginning of any term after the medical condition in question has been corrected. In some cases students must satisfy the Gannett Health Center that the condition has been corrected before they may return. The student's academic standing will also be subject to review at the time of the leave and on return.
3) *Conditional leaves* may be granted if the student is not in good standing or, in unusual circumstances, after the seventh week of the term. Normally students may not return from conditional leaves for at least two terms or until specific and individual conditions, such as completing outstanding work, have been met.
4) *Required leaves:* The Academic Records Committee may require a leave of absence if a student is not making satisfactory progress toward the degree. See the section "Academic Actions."

Any student who wishes to take a leave of absence should consult an assistant dean in the Academic Advising Center. On readmission, the student's graduation date will be recalculated according to the number of terms completed, the number of acceptable credits earned toward the degree, and the requirements for graduation. *Students who take courses elsewhere while on leave, may petition to have credits accepted as out-of-college credits allowed toward the 120 credits needed for graduation. Approval depends on the judgment of the relevant departments and acceptable grades.* Credits earned on leave do not count toward the eight semesters of residence unless a student petitions successfully to accelerate. See the section "Residence."

Withdrawals

A withdrawal is a voluntary severance of connection with the university. If a student wants to withdraw after registering for the term, the withdrawal must be requested before the end of the seventh week of classes to avoid grades of "W" on the transcript. A notation of "W" will appear on the transcript

for any course dropped after the seventh week. On withdrawal it is assumed that the student will not want to reregister in the college. Students who seek readmission after withdrawing from the college write an appeal to the Committee on Academic Records. If a student fails to register for a term and does not request a leave, the student will be withdrawn from the college for failure to register.

Transferring within Cornell (Internal Transfer)

Internal transfer from one college or school at Cornell into another is attractive for many students whose intellectual interests change. Students who want to transfer should discuss their eligibility with a counselor at the new school or college.

In some cases students who want to transfer into the College of Arts and Sciences may transfer directly. In other cases they may be referred to the Internal Transfer Division. During the term immediately preceding transfer into the College of Arts and Sciences, students should complete at least 12 credits of courses in the College of Arts and Sciences with superior grades and without any grades of *Incomplete*, any S-U grades (unless only S-U grades are offered for that particular course), or any grades below C. Satisfying this minimum requirement does not, however, guarantee admission. Admission to the college is based on consideration of the student's entire record at Cornell and the high school record, not just the work of one semester. Interested students should see associate director Gabard, in Arts and Sciences Admissions, 172 Goldwin Smith Hall.

Part-Time Study

The college ordinarily expects its students to be full-time students. Except in the case of Ithaca residents who are twenty-three years of age or older, part-time attendance is permitted only in unusual circumstances.

In certain circumstances seniors who are completing their final term in the college may be allowed to register in the Division of Extramural Study for fewer than 12 credits. Tuition is charged per credit. The guidelines for granting this permission are adhered to strictly.

Guidelines for part-time study:

1) A student who has completed all degree requirements by the end of the seventh term, and could have received permission to accelerate, may receive permission to study part-time during the eighth term.
2) A student who has completed all degree requirements in seven terms but is majoring in a department that requires candidates for honors to complete the thesis in the eighth term may be permitted to register for fewer than 12 credits.
3) A student who has received permission to accelerate, but who has been forced to drop a course (for reasons beyond his or her control) and has not been able to complete the course work on schedule, may be able to complete the requirements as a part-time student.
4) A student who is pursuing honors work and must complete extensive research away from the campus, which precludes registering for additional courses, may be allowed to register for fewer than 12 credits.

ACADEMIC STANDING

Students are in good standing for the term if they successfully complete at least 12 credits by the end of the term and receive no more than one D and no F or U grades. If a student completes only three courses, all grades must be above D. In addition, students are expected to make satisfactory progress toward satisfying requirements for the degree. They are expected to earn grades of C (not C–) or better in at least 100 of the total credits for the degree.

Honors

Dean's List

Inclusion on the Dean's List for academic excellence is an honor bestowed by the dean of the college. The criteria are subject to change from semester to semester and are available in the Office of Records and Scheduling, M46 Goldwin Smith Hall.

Bachelor of Arts with Honors

Almost all departments offer honors programs for students who have demonstrated exceptional ability in the major and who seek an opportunity to explore branches of their subject not represented in the regular curriculum or to gain experience in original research. The honors programs are described by individual departments in the following sections. The degree of Bachelor of Arts with honors will be conferred upon students who, in addition to having completed the requirements for the degree of Bachelor of Arts, have satisfactorily completed the honors program in their major and have been recommended for honors by their major department, the Independent Major Program, or the College Scholar Program. *Concentrations do not offer honors programs.*

Bachelor of Arts with Distinction

The degree of Bachelor of Arts with distinction in all subjects will be conferred on students who have completed the requirements for the degree of Bachelor of Arts, if they have met the following requirements by the end of their final semester:

1) completed at least 60 credits while registered in regular sessions at Cornell;
2) ranked in the upper 30 percent of their class at the end of their seventh semester, or next-to-last semester for transfers and accelerants;
3) received a grade below C– in no more than one course;
4) received no failing grade;
5) maintained good standing in each of their last four terms; and
6) have no *Incompletes* remaining on their records.

Failure to Maintain Good Standing

Students are not in good standing if they complete fewer than 12 credits, except for second-semester seniors who need fewer credits and courses to graduate; if they have more than one D, or one D in a schedule with only three courses, or any F or U grades; if they have not made satisfactory overall progress in grades or credits (whether due to failures or *Incompletes*) or in the requirements of the college or the major. Such students will be considered for academic action by the Committee on Academic Records or one of the deans of the college.

Academic Actions

Warning. Any student who fails to maintain good standing will at least be warned. The warning may be given by an assistant dean in the college or by the faculty's Committee on Academic Records. A warning is posted on a student's unofficial college transcript but is not reported to the university registrar and does not appear on official transcripts.

Required leave of absence. A student in serious academic difficulty may be required by the Committee on Academic Records to take a leave of absence, normally for a full year. Usually, but not necessarily, the Committee on Academic Records warns students before suspending them. Before being allowed to return and reregister in the college, students must submit a plan for completing the degree. In some cases the students will be required to furnish evidence that they are ready to return before being allowed to reregister in the college. Students who request to return in less than a year must present to the committee exceptionally strong evidence of their readiness to return. "Required leave of absence" and the date are posted on the student's transcript.

Required withdrawal. The Committee on Academic Records may dismiss a student from the college because of a highly unsatisfactory record for one term or for failure to make satisfactory overall progress in grades, credits, or the requirements of the major. This action expels the student permanently from the college. "Required withdrawal" and the date are posted on the student's transcript.

Students being reviewed for academic action are urged to present evidence that will help explain their poor academic performance. Students may appeal a decision or action of the committee if they have new relevant information to present.

GRADES

Letter Grades

See Grading Guidelines.

S-U Grades

The S-U option allows students to explore unfamiliar subject areas without being under pressure to receive high grades. It is not meant to reduce the amount of work a student completes in a course or the amount of effort a student devotes to a course. Students may elect during the first three weeks of the term to receive a grade of S (satisfactory) or U (unsatisfactory) instead of one of the letter grades (A+ through F), provided that the instructor is willing to assign

such grades. **Students may not elect the S-U option after the third week of the term.** A grade of S is equivalent to a grade of C– or higher; a grade of U, which is equivalent to any grade below C–, is a *failing* grade equal to an F. S means the student receives the credit specified for the course. U means no credit is given. A few courses in the college are graded exclusively S-U; in that case, the final grade appears on the transcript as SX or UX.

Courses that will count toward satisfaction of major requirements should not be taken for an S or U grade unless the department grants permission. Students may elect the S-U option in courses used to satisfy the distribution and language requirements, provided that such courses do not also count toward major requirements or serve as prerequisites for admission to the major. Students are advised to use the S-U option sparingly if they intend to apply to graduate school or for transfer to another college. There is no limit on the number of courses each term for which students may elect the S-U grade, but within the 120 credits required for the degree, a minimum of 80 credits must be in courses for which a letter grade was received.

Students may not change from S-U to a letter grade after the fifth week of the term.

Grades of Incomplete

A grade of incomplete signifies that a course was not completed before the end of the term for reasons beyond the student's control that are acceptable to the instructor. Students must have substantial equity in the course; that is, they must be able to complete the remaining work without further registration and must have a passing grade for the completed portion. When a grade of incomplete is reported, the instructor will state what work must be completed, when it must be completed, and the grade earned if the work is not completed by that date. When a final grade is reported, it is recorded on the official transcript with an asterisk and a footnote explaining that this grade was formerly an incomplete.

Once a grade of incomplete is assigned, the college does not change it unless and until the faculty member submits a change of grade form or gives written permission to "freeze" it as an incomplete.

Students must consult the instructors to resolve any incompletes before graduation.

R Grades

R designates two-semester or year-long courses. The R is recorded on the student's transcript at the end of the first term. The grade recorded at the end of the second term shows the student's level of performance in the course for the entire year. The total credits that will be earned for the whole course are listed each term.

Grade Reports

Grade reports for the fall term are included in spring-term registration materials; grade reports for the spring term are mailed to students at their home addresses. Grades are mailed to the home address for *parents* only if the student requests "Parent Grade Mail" on the university registration form.

Class Rank

The college does not compute class rank.

CALENDAR SUPPLEMENT

All of the dates in the university calendar at the front of this volume apply to all Cornell students. Listed below are some additional dates that are of importance for students in the College of Arts and Sciences.

	Fall	*Spring*
First deadline for submitting independent major requests. Go to Academic Advising Center, 55 Goldwin Smith Hall, for further information.	Sept. 28	Feb. 22
Last day for adding courses without petition.	Sept. 18	Feb. 12
Last day for changing grade option to S-U.	Sept. 18	Feb. 12
Last day for changing grade option to letter.	Oct. 2	Feb. 26
Second deadline for submitting independent major requests. Go to Academic Advising Center, 55 Goldwin Smith Hall, for further information.	Nov. 30	April 5
Last day for requesting leave of absence or withdrawal for the current term.	Oct. 26	March 15
Last day for dropping courses without petition.	Oct. 16	March 12
Deadline for applying to study abroad.	See Cornell Abroad, 474 Uris Hall	
Course enrollment (pre-registration) for the following term (tentative).	Oct. 21–Nov. 4	March 31–April 14
Last day to petition to drop a course.	Nov. 20	April 23
Deadline for applying to the College Scholar Program.	April 28	
Deadline for requesting internal transfer to the College of Arts and Sciences for the following term.	Dec. 1	May 1

ADMINISTRATION

Don Randel, dean — 255–4146

Elizabeth Adkins-Regan, associate dean — 255–4147

Phillip Lewis, associate dean — 255–4147

Lynne S. Abel, associate dean — 255–5004

Thak Chaloemtiarana, associate dean and director of admissions — 255–7061

Gerry Cox, associate director of admissions and coordinator of outside scholarships — 255–4833

Ken Gabard, associate director of admissions and adviser for internal transfer students — 255–4833

Steve Saraydar, associate director of admissions and adviser for mid-year freshmen and dual degree students — 255–4833

Peggy Walbridge, associate director of admissions and adviser for transfer students — 255–4833

Bonnie Buettner, assistant dean for seniors and juniors, and prelaw adviser — 255–5004

Beatrice G. Rosenberg, assistant dean for sophomores and juniors, and study abroad adviser — 255–5004

Maria Terrell, assistant dean for freshmen and director of student advising — 255–5004

Janice Turner, assistant dean, minority affairs, and premedical adviser — 255–5004

Marilyn Williams, assistant dean, undergraduate research and academic integrity — 255–5004

Patricia M. Dougherty, college registrar — 255–5051

Michele T. Crane, associate registrar — 255–4246

Courses and Departments

SPECIAL PROGRAMS AND AREAS OF CONCENTRATION

The college offers a number of special and interdisciplinary programs that are described following the departmental program descriptions. Students may devise an independent major with the aid of any of these programs or develop an informal minor field. (Informal minors are not listed on the student's official record.)

GENERAL EDUCATION COURSES

The introductory and advanced courses offered by departments in their respective disciplines and fields comprise the bulk of the curriculum in the College of Arts and Sciences. Most of these courses are accessible to almost all students who are interested in them. However, the faculty of the college also offers general education courses, including interdisciplinary courses for a broad audience, courses that provide insight into a particular discipline for students who are not specializing in that field, and courses for advanced students who consider a discipline in terms of its history, its presuppositions, or its relation to other branches of knowledge. The following courses have been identified by the various departments of the College of Arts and Sciences as particularly appropriate, by that definition, for general education. For full course descriptions consult the departments' sections of the catalog.

American Studies

Some professors in English and history (and other fields, such as government and art history) with an interest in American studies regularly teach courses that emphasize the

interconnections of literary, historical, and other materials. Some courses focus on these interconnections with a nonspecialist audience in mind; others aim at an upper-level audience to put literature and history in a comparative perspective with respect to a common subject. These purposes may suit not only American studies, English, or history majors, but also the general-education interests of nonmajors. Members of the American Studies Committee can be consulted about the pertinence of their courses to general education.

Archaeology

Several members of the Archaeology Program offer general education courses suitable for nonmajors. These are listed under the departments that offer archaeology courses, such as the departments of Anthropology, Classics, History of Art, and Near Eastern Studies. The Archaeology Program itself also offers:

ARKEO 203 Early People: The Archaeological and Fossil Record (also Anthropology 203)
Spring. 3 credits.
T. P. Volman.

Asian American Studies

See Special Programs and Interdisciplinary Studies.

Asian Studies

ASIAN 208 Introduction to Southeast Asia @
Spring. 3 credits.
Staff.

ASIAN 211 Introduction to Japan @
Fall. 3 credits.
N. Sakai.

ASIAN 212 Introduction to China @
Spring. 3 credits (4 credits with a special project; consult instructor for information).
Staff.

ASIAN 215 Introduction to South Asian Civilizations @
Fall. 3 credits (4 credits with a special project; consult instructor for information).
A. Gold.

ASIAN 218 Introduction to Korea @
Spring. 3 credits.
D. McCann.

Astronomy

ASTRO 490 Senior Seminar—Critical Thinking
Spring. 3 credits. Prerequisite: permission of instructor.
Hours to be arranged. C. Sagan.

Classics

CLASS 211 The Greek Experience @
Fall. 3 credits.
J. Coleman.

CLASS 212 The Roman Experience @
Spring. 3 credits.
D. Mankin.

CLASS 217 Initiation to Greek Culture
Fall. 4 credits.
J. DeFilippo, P. Mitsis.

CLASS 218 Initiation to the Classical Tradition: Voyages to Strange Worlds
Spring. 4 credits.
C. Kaske, D. Shanzer.

[CLASS 219 Mediterranean Archaeology (also Near Eastern Studies 267)
3 credits. Not offered 1992–93; next offered 1993–94.
J. Coleman.]

CLASS 220 Introduction to Classical Archaeology (also History of Art 220)
Spring. 3 credits.
J. Whitehead.

CLASS 221 Minoan-Mycenaean Art and Archaeology (also Archaeology 221 and History of Art 221)
Fall. 3 credits.
J. Coleman.

[CLASS 223 The Comic Theater (also Comparative Literature 223 and Theatre Arts 223) #
3 credits. Not offered 1992–93; next offered 1993–94.
J. Rusten.]

CLASS 235 Modern Greek Poetry and Politics (also Comparative Literature 235)
Fall. 3 credits.
G. Holst-Warhaft.

CLASS 236 Greek Mythology (also Comparative Literature 236) #
Fall or summer. 3 credits.
D. Mankin.

[CLASS 237 Greek Religion and Mystery Cults (also Religious Studies 237) #
3 credits. Not offered 1992–93.
K. Clinton.]

[CLASS 238 The Ancient Epic #
3 credits. Not offered 1992–93.]

[CLASS 250 Etruscan Art and Archaeology (also Archaeology 250 and History of Art 223) #
3 credits. Not offered 1992–93.]

[CLASS 300 Greek and Roman Drama (also Comparative Literature 300) #
4 credits. Not offered 1992–93.]

CLASS 333 Greek and Roman Mystery Cults and Early Christianity (also Religious Studies 333) #
Spring. 4 credits.
K. Clinton.

CLASS 337 Ancient Philosophy of Science #
Fall. 4 credits.
T R 2:55–4:10. P. Mitsis.

[CLASS 339 Ancient Wit (also Comparative Literature 339) #
Fall. 4 credits. Not offered 1992–93.
F. Ahl.]

[CLASS 363 Representations of Women in Ancient Greece and Rome (also Women's Studies 363) #
Fall. 4 credits. Not offered 1992–93; next offered 1993–94.
L. S. Abel, J. Ginsburg.]

CLASS 480 Roman Society and Politics under the Julio-Claudians #
Spring. 4 credits.
J. Ginsburg.

English

See, in the department's listing, "Courses Primarily for Nonmajors."

Geological Sciences

GEOL 101 Introductory Geological Sciences
Fall, spring, summer. 3 credits.
2 lecs, 1 lab, field trips, evening exams in the fall term. Fall, W. B. Travers; spring, J. M. Bird.
This course teaches observation and understanding of the earth, including oceans, continents, coasts, rivers, valleys, glaciated regions, earthquakes, volcanoes, and mountains; theories of plate tectonics; the origin, discovery, and development of mineral and water resources. The lab teaches use of topographic and geologic maps and recognition of minerals and rocks and includes field trips to Cascadilla Gorge, Fall Creek, and Enfield Glen.

GEOL 102 Evolution of the Earth and Life
Spring. 3 credits. Geological Sciences 101 recommended.
2 lecs, 1 lab, field trips, weekly quizzes, no midterm. J. L. Cisne.
The story of the earth and life in terms of evolutionary processes and the global economy and material. The planet as a by-product of stars' evolution. Plate tectonics, continental drift, and their implications for life, fossil fuels, and climate. The greenhouse effect and its few-billion-year history. Evolution of life; human ancestry; dinosaurs. Labatories examine the rocks and fossils that tell the story. Field trips to fossil-collecting sites and Taughannock Gorge.

GEOL 103 Introductory Geology in the Field
Fall. 3 credits. Limited to 35 students.
1 lec, 1 field trip or lab, 1 rec.
A. L. Bloom.
The subject matter of Geol 101, Introductory Geological Sciences, taught as much as possible by field trips in the campus and vicinity on foot and by bus. Weekly field trips until November introduce most of the major topics of the course, supplemented by lectures, recitations, and labs later in the term.

GEOL 104 The Sea: An Introduction to Oceanography (also Biological Sciences 154)
Spring. 3 credits.
2 1-hr lecs, 1 2 1/2-hr lab. W. M. White, C. Greene.
A survey of the physics, chemistry, geology, and biology of the oceans for both science and non-science majors. Topics include: sea-floor spreading and plate tectonics; marine sedimentation; chemistry of seawater; ocean currents and circulation; the oceans and climate; ocean ecology; coastal processes; marine pollution and waste disposal; marine resources.

GEOL 111 To Know the Earth
Fall. 3 credits.
2 lecs, 1 lab, and field trips. J. E. Oliver.
A course to acquaint the non-scientist with the earth. Geology as an intellectual challenge, a provider of resources, an environment, a danger, a base for culture, and a science among sciences. The story behind landscapes, mountains, earthquakes, volcanoes, oceans, gold, petroleum, and icecaps. The record of the past, the context of the present, the forecast for the future.

GEOL 202 Environmental Geology
Spring. 3 credits.
2 lecs, 1 rec, lab or field trip. D. E. Karig. In-depth introduction to geologic processes that affect or are affected by human society, including stream behavior and floods, earthquakes, land stability and mass-wasting, and volcanic hazards. This material provides an application of geology to engineering, natural resources, and land-use planning. Local examples are discussed and visited on short field trips. The course can be taken as an introduction to geology, but also serves as a continuation of Geol 101.

German Studies

GERST 322 Medicine and Civilization (also Biology and Society 322) #
Fall. 3 credits.
M 12:20–2:15. S. L. Gilman.

GERST 325 Culture of the Spectacle: Media and Cultural Representation
Fall. 4 credits.
T R 11:40–12:55. N. M. Alter.

GERST 411 African-Americans and Jewish-Americans: Identities, Parallels, and Conflicts (also Africana Studies 411)
Spring. 4 credits.
M 12:20–2:15. S. L. Gilman and W. Cross.

History of Art

All 200-level courses and some 300-level courses. See department listing.

Psychology

[PSYCH 326 Evolution of Behavior
Fall. 4 credits. Not offered 1992–93.
R. Johnston.]

PSYCH 418 Psychology of Music
Spring. 3 or 4 credits.
T R 1:25–2:40. C. Krumhansl.

Russian Literature

[RUSSL 207 Readings from Russian Culture #
Fall. 3 credits. Not offered 1992–93.
M W F 1:25. G. Shapiro.]

RUSSL 208 Readings from Russian Culture II
Spring. 3 credits.
M W F 1:25. G. Shapiro.

[RUSSL 329 Eastern Europe Today: Economics, Government, Culture (also Economics 329 and Government 326)
Fall. 4 credits. Not offered 1992–93.
G. Gibian, M. Rush, G. Staller.]

RUSSL 350 Education and the Western Literary Tradition (also Comparative Literature 350 and College Scholar 350) #
Spring. 4 credits.
T R 2:55–4:10. P. Carden.

[RUSSL 367 The Russian Novel (also Comparative Literature 367) #
Spring. 4 credits. Not offered 1992–93.
T R 10:10–11:25. G. Gibian.]

RUSSL 373 Chekhov #
Spring. 4 credits.
T R 1:25–2:40. S. Senderovich.

Sociology

SOC 101 Introduction to Sociology
Fall. 3 credits.
W F 10:10–11 plus one section.
H. A. Walker.
This course provides an introduction to theory and research in sociology. It demonstrates how the insights, theories, and methods of sociological analysis can be brought to bear on major issues of social life. A primary goal is to convey a sense of the manner in which sociologists formulate theories and how the collection and analysis of data are used to evaluate those theories. The course will provide "hands-on" experience in analyzing sociological issues. Students undertake guided research exercises that involve using computers to analyze actual data. No background experience is presumed; necessary skills are covered in class and section meetings.

SOC 103 Introduction to Sociology: Microsociology
Fall. 3 credits.
M W F 9:05–9:55. D. P. Hayes.
An introduction to microsociology, focusing on concepts and theory of social processes within small groups, including the family. Emphasis is on leadership, conformity, social influence, cooperation and competition, distributive justice, and micro-analyses of interaction.

SOC 104 Race and Ethnic Relations
Fall. 3 credits.
W F 1:25–2:15 plus one section.
H. A. Walker.
This course focuses on race and ethnic relations in contemporary perspective. It examines the social and behavioral implications of attributions of race and ethnicity in small group interaction, in the world of work, and in the larger society. Topics: Inequalities in income and employment, affirmative action, ethnic political mobilization, patterns of marriage and family formation.

SOC 110 Introduction to Economy and Society
Spring. 3 credits.
M W F 10:10–11. V. Nee.
Modern social thought arose out of attempts to explain the relationship between economic change and the social transformations that gave rise to the contemporary world. Classical theorists from Marx, Weber, and Durkheim to Polanyi focused their writings on emergent capitalist economies and societies. Contemporary social theorists likewise have sought to understand the interaction between capitalism and the social forces reacting against and emerging from modern economic development. From exchange and rational choice theories to network analysis and structural theories, a central theme in contemporary social thought has been the relationship between the economy and society, economic action and social structure, rationality and fundamental social processes. This course provides an introduction to social thought and research seeking to understand and explain the relationship between economy and society in the modern era.

SOC 115 Utopia in Theory and Practice
Spring. 3 credits.
D. Strang.
This course examines imaginings of the "ideal society" and efforts to realize them. We discuss the classic literary utopias, from Plato's *Republic* to More's *Utopia* to Bellamy's *Looking Backward*, and also the dystopias of Huxley and Orwell. We also examine social experiments like the nineteenth-century American intentional communities, various socialisms, and the design of contemporary political constitutions. Throughout, the emphasis is on two sociological questions. What leads people to conceive of particular social arrangements as ideal? How can we tell social structure that can work from those that cannot?

AKKADIAN

See Department of Near Eastern Studies.

AMERICAN STUDIES

G. Altschuler (B-12 Ives Hall, 255–4987) acting chair and director of undergraduate studies; S. Blumin, M. Kammen, D. McCall, R. L. Moore, R. Polenberg, J. Porte, S. Samuels, F. Somkin, S. C. Strout (Emeritus)

The Major

The major in American studies, appropriate for a wide variety of future professions, is basically a program of coordinated study in the history and literature of the United States. Although interdisciplinary, it is not a "double major." The prerequisites are one course in European, British, or American history at the 100 or 200 level and one course in British or American literature at the 200 level. Students who contemplate becoming American studies majors are encouraged to speak with the chair as early as possible to arrange for a major adviser.

In consultation with their advisers, American studies majors elect 32 credits (or eight courses) of work in the history and literature of all three large periods into which the nation's development can be divided (defined for the purposes of the program as colonial, nineteenth century, and twentieth century). To gain both depth and breadth, they select as an area of concentration either a single period (or the connections between two of the periods) and take either 16 credits in one period and 8 credits in each of the other two, or 12 credits in each of the two periods whose connections constitute the focus of the study and 8 credits in the third. In addition, they take one of the adviser-approved interdisciplinary seminars at the 400 or 600 level. When the subject matter is appropriate, such a seminar may count toward the satisfaction of the period requirements. Students may divide the work between history and literature in whatever proportion serves their interests, provided that they take no more than two-thirds of their courses in any one department.

Beyond the basic requirements in American history and American literature, 12 credits above the elementary level are required in allied subjects. Eight credits of work are in the history or literature, or both, of another related culture; and 4 credits are in American thought, society, or culture studies from the perspective of another discipline such as anthropology, economics, government, history of art, or sociology. (This last 4-credit requirement may be satisfied outside the college.)

Courses in American history that will satisfy the 32-credit requirement described in the second paragraph are offered by the Department of History; those in American literature are offered by the Department of English, the Department of Theatre Arts, and the Africana Studies and Research Center. Occasionally a course that fits an individual student's program may be offered elsewhere. Substitution will depend on the adviser's approval. Advisers determine what courses count for the interdisciplinary seminar.

Honors. Candidates for honors must maintain an average of B+ in courses pertinent to the major. To be eligible for a degree with honors in American studies, a student must in the senior year either write an honors essay for American Studies 493, Honors Essay Tutorial, or submit to the American Studies Committee three term papers written for courses in the major and take an oral examination in the declared area of special interest.

AM ST 101 Introduction to American History
Fall. 3 credits.
M W F 11:15–12:05. G. Altschuler.
A survey of U.S. history designed to introduce students to major themes and interpretations. History 101 traces the origins and evolution of the nation through 1865. Topics include Puritanism, the American Revolution, the Constitution, Jacksonian democracy, and the Civil War.

AM ST 102 Introduction to American History
Spring. 3 credits.
TBA. G. Altschuler.
A survey of U.S. history designed to introduce students to major themes and interpretations. Covers the period from the Civil War to the present. Topics include the Reconstruction, the Gilded Age, the world wars, the 1960s, Vietnam, and Watergate.

AM ST 304 American Culture in Historical Perspective
Spring. 4 credits.
M W F 1:25–2:15. M. Kammen.
For description, see History 304.

AM ST 360 Painting and Everyday Life in Nineteenth-Century America (also History of Art 360)
Spring. 4 credits.
M W F 11:15–12:05. L. Meixner.
For description, see History of Art 360.

[AM ST 465 Proseminar in American Studies (also English 465)
4 credits. Not offered 1992–93.]

AM ST 493 Honors Essay Tutorial
Fall or spring. Up to 4 credits each semester.
See G. Altschuler for appropriate advisers.

ANTHROPOLOGY

D. H. Holmberg, chair; R. Ascher, J. Borneman, J. Fajans, D. J. Greenwood, J. S. Henderson, B. J. Isbell, A. T. Kirsch, B. Lambert, T. F. Lynch, K. S. March, C. Morris, E. Povinelli, P. S. Sangren, J. T. Siegel, M. F. Small, R. J. Smith

Anthropology is unique in that it takes humanity in its broadest sense as its subject matter. It is a discipline that stresses the world's cultural diversity by means of a comparative perspective. This means that anthropologists are interested in cultural differences in and among modern societies as well as cultural change over time. As we look ahead to the twenty-first century, anthropology prepares students to think globally about humankind as thinkers, actors, builders, and as living organisms in a complex and fragile ecosystem.

The three branches of anthropology are archaeology, biological anthropology, and sociocultural anthropology. Archaeologists collect and interpret the record of the past to extend our understanding of human history and social change. That record tells the story not only of "ancient" societies, but also of the rise of civilizations that were the direct forebears of the contemporary nations that we know today. Archaeology also tells the story of human origins, the invention of farming and settled life, the rise of complex social institutions and technologies, and the worldviews of the past, among other themes. Biological anthropologists consider human experience from the perspective of questions of evolution, anatomy, genetics, cognition, nutrition, disease, medicine, ecology, and primate studies, offering multiple approaches to the question of human beings' "humanness." Some essential human attributes (complex thinking and communication, social organization, among other things) are shared with other higher primates. Sociocultural anthropology, like archaeology, looks at the worlds humans make for themselves. Sociocultural anthropologists examine the diversity of behaviors, relationships, economies, political and legal orders, worldviews, logics, languages, symbols, myths, and religions—among the many other means human beings invent to create and reproduce social life around the world. Sociocultural anthropologists collect data primarily through ethnographic fieldwork, that is, months or years participating and observing in the societies they study.

Together, the three branches of the discipline offer an integrated approach to the immense diversity of human experience. Through its subject matter, theories, and methods, anthropology also offers students a chance to integrate the three divisions of the university: the humanities, social sciences, and natural sciences. Each branch of anthropology involves these three subject areas in different ways. For purposes of distribution requirements in the College of Arts and Sciences, courses in anthropology count toward the social science requirement.

The major is designed to offer students opportunities to study all three branches of anthropology, through courses on particular topics (e.g., agriculture, religion, or economics), on world areas, and on theoretical problems. The requirements for majors are outlined below. Within the major, students may design their own specialties in consultation with a faculty adviser. Specialties may be developed through any combination of 300- and 400-level courses in the department, independent study, courses in related fields, and honors work.

The Major

1) Applicants for the major in anthropology must complete Anthropology 101 and 102. Preferably, these courses will be taken in the freshman or sophomore years.
2) Students who major in anthropology:
   a) Take at least one course at the 200 level or above in each of categories III, IV, V, VI, and VII from the listing below. In satisfaction of this requirement, no course may be used to fulfill more than one category.
   b) Develop one or more areas of specialization within the discipline in consultation with his or her faculty adviser. Examples of such specializations include sociocultural anthropology, anthropological archaeology, theory and history, and biological anthropology.
   c) Take a total of 32 credits of course work except for Anthropology 200, above the 100 level. Up to 8 credits of course work in cognate disciplines related to the student's specialization may be accepted for the major with the permission of the faculty adviser.
   d) When appropriate, special provisions for meeting major requirements may be arranged with the faculty adviser's approval.

Honors. Anthropology majors interested in the honors program should consult the director of undergraduate studies before the beginning of their senior year and apply for admission to the program. Candidates for the degree of Bachelor of Arts with honors in anthropology must complete a thesis in the final term of the senior year. Students may enroll in Anthropology 491 or 492, Honors Thesis, after obtaining the consent of the Honors Committee. The decision to award honors and in what degree is based on the quality of the thesis and the student's overall record.

Facilities

The anthropology laboratory contains a small statistical and reference library as well as basic drafting and photographic equipment. In addition, the department has a collection of archaeological, ethnological, and biological materials used in teaching and research.

Special Programs

Specialized individual study programs are offered in Anthropology 497–498, Topics in Anthropology, open to a limited number of juniors and seniors who have obtained consent of the instructor. Undergraduates should also note that most 600-level courses are open to them if consent of the instructor is obtained.

The Department of Anthropology holds colloquia throughout the academic year. Faculty members from Cornell and other universities participate in discussions of current research and problems in anthropology. Students are encouraged to attend.

Anthropology majors have also established an anthropology club, which sponsors educational and social events in conjunction with graduate students and faculty in the department.

I. Introductory Courses

Note: For additional freshman writing seminars in anthropology, see "Freshman Writing Seminars" and the John S. Knight Writing Program's special brochure.

ANTHR 101 Introduction to Anthropology: Biological Perspectives on the Evolution of Humankind
Fall. 3 credits.
M. F. Small.
The evolution of humankind is explored through the fossil record, studies of the biological differences among current human populations, and a comparison with our closest relatives, the primates. This course investigates the roots of human biology and behavior with an evolutionary framework. Fee for lab usage and maintenance, $10.

ANTHR 102 Introduction to Anthropology: The Comparison of Cultures @
Spring. 3 credits.
D. H. Holmberg.
An introduction to cultural anthropology through ethnographies, or the descriptive accounts of anthropologists. Through readings and lectures students acquaint themselves with a number of cultures from several parts of the world. The cultures range in form from those of small-scale tribal societies to those of state societies. Throughout the course we attempt to make sense of exotic cultures in their own terms. Attention is focused on variation in cultural patterns as they are expressed in social, economic, and ritual practices. In this encounter the principles of anthropology, as a comparative enterprise that poses distinct cultural systems in relief, will be developed. Fiction, films, and exercises supplement the formal anthropological materials.

ANTHR 103 The Scope of Anthropology
Fall and spring. 1 credit. Prerequisite: concurrent enrollment in or prior completion of Anthropology 101 or Anthropology 102. S–U grades only.
Staff.
This course is intended for majors in anthropology, prospective majors, and other interested students. Each week a different member of the faculty in anthropology at Cornell will make a presentation on the nature of their work within the field and discuss their interests with students. The course is meant to introduce the range of approaches found within anthropology and help students in planning future course work.

ANTHR 200 Cultural Diversity and Contemporary Issues @
Fall. 3 credits.
J. Borneman.
This course will introduce students to the meaning and significance of forms of cultural diversity for the understanding of contemporary issues. Drawing from film, video, and selected readings, students will be confronted with different representational forms that portray cultures in various parts of the world, and they will be asked to examine critically their own prejudices as they influence the perception and evaluation of cultural differences. We shall approach cultures holistically, assuming the inseparability of economies, kinship, religion, and politics, as well as interconnections and dependencies between world areas (e.g., Africa, Latin America, the West). Among the issues considered: "political correctness" and truth; nativism and ecological diversity; race, ethnicity, and sexuality; sin, religion, and war; global process and cultural integrity.

II. Courses Intended Primarily for Majors

ANTHR 491 Honors Thesis
Fall. 4 credits. Prerequisite: consent of the Honors Committee. Intended for majors graduating in mid-year.
Hours to be arranged. Staff.
Independent work under the close guidance of a faculty member selected by the student.

ANTHR 492 Honors Thesis
Spring. 4 credits. Prerequisite: consent of the Honors Committee.
Hours to be arranged. Staff.
Independent work under the close guidance of a faculty member selected by the student.

ANTHR 495 Social Relations Seminar (also Sociology 497)
Fall. 4 credits. Limited to seniors majoring in social relations.
Hours to be arranged. Staff.

ANTHR 497–498 Topics in Anthropology
497, fall; 498, spring. Credit to be arranged. Intended for undergraduate students only.
Hours to be arranged. Staff.
Independent reading course in topics not covered in regularly scheduled courses. Students select a topic in consultation with the faculty member who has agreed to supervise the course work.

III. Archaeological Courses

See also courses listed under Archaeology.

ANTHR 203 Early People: The Archaeological and Fossil Record (also Archaeology 203)
Spring. 3 credits.
T. P. Volman.
For course description, see ARKEO 203.

[ANTHR 204 Ancient Civilizations (also Archaeology 204) @#
Spring. 3 credits. Not offered 1992–93.]

[ANTHR 216 Ancient Societies @#
Fall. 3 credits (4 by arrangement with instructor). Not offered 1992–93.]

[ANTHR 317 Stone Age Archaeology (also Archaeology 317)
Spring. 4 credits. Not offered 1992–93.]

[ANTHR 352 Interpretation of the Archaeological Record
Fall. 4 credits. Not offered 1992–93.]

ANTHR 354 The Peopling of America @#
Fall. 4 credits.
T. F. Lynch.
Prehistoric discovery of the New World, beginning with American Indian origins in Asia and ending with the largely unrecorded European medieval contact with North America. Major topics include crossing the Bering land bridge, big-game hunting and extinctions, postglacial adaptations to changing environments, diversified subsistence in the eastern woodlands, agricultural civilizations of the Midwest and Southwest, and Eskimo and Norse exploration and settlement across the Arctic and North Atlantic.

ANTHR 355 Archaeology of Mexico and Central America @#
Spring. 4 credits.
J. S. Henderson.
A survey of the cultural history of ancient Mexico and Central America, emphasizing Aztec and Maya civilizations. The use of ethnographic and historical information to enrich archaeological interpretation is a general theme. Specific topics include the emergence of settled farming life, the rise of civilization and the state, and the development of mechanisms that linked the many societies in the region into a single sphere of interaction.

[ANTHR 356 The Archaeology of South America @#
Spring. 4 credits. Not offered 1992–93.]

[ANTHR 358 Archaeological Research Methods (also Archaeology 358)
Spring. 4 credits. Not offered 1992–93.]

[ANTHR 361 Field Archaeology in South America (also Archaeology 361) @#
Spring. 10 credits. Not offered 1992–93.]

[ANTHR 435 Investigation of Andean Institutions: Archaeological Strategies @#
Fall. 4 credits. Not offered 1992–93.]

ANTHR 493 Seminar in Archaeology: The Aztecs (also Archaeology 493) @#
Fall. 4 credits.
J. S. Henderson.
Examines the Aztec empire as it was at the time of the European conquest of Mexico and examines the astonishingly rapid transformation of Aztec society from foraging bands into imperial city-dwellers. Theoretical emphasis is on integrating historical and archaeological data to reconstruct ancient societies.

[ANTHR 494 Seminar in Archaeology: The State (also Archaeology 494) @#
Spring. 4 credits. Not offered 1992–93.]

IV. Biological and Ecological Anthropology

[ANTHR 275 Human Biology and Evolution (also Biological Sciences 275 and Nutritional Science 275)
Fall. 3 or 4 credits (4 credits with discussion). Not offered 1992–93.]

[ANTHR 371 Human Paleontology (also Biological Sciences 371)
Fall. 4 credits. Not offered 1992–93.]

[ANTHR 390 Primate Behavior and Ecology
Spring. 4 credits. Not offered 1992–93.]

ANTHR 391 The Evolution of the Human Life Cycle
Spring. 3 credits. Limited to 25 students.
M. F. Small.
Humans, like all animals, are molded by evolution. The various life cycle stages in our species, such as a long infant dependency, mate choices, and the extended period of aging, have been shaped by physiological constraints and adaptation to human ways. The purpose of this course is to examine the human life cycle with an eye toward how biology and evolution have selected for human patterns. In class, lectures will focus on human physiology and evolutionary theory. Readings will compare life cycle stages in several aboriginal cultures. Discussion sections will concentrate on the life cycle as the student experiences it in American culture. Life cycle stages include conception,

pregnancy, birth, childhood, adolescence, mate choice and marriage, adulthood, aging and death.

ANTHR 474 Laboratory and Field Methods in Human Biology (also Biological Sciences 474)
Spring. 4 credits. Prerequisite: one year of introductory biology, Anthropology 101, or permission of instructor. Offered alternate years.
K. A. R. Kennedy.
For course description, see BIO S 474.

ANTHR 490 Primates and Evolution
Spring. 4 credits. Prerequisite: Anthropology 390 or permission of instructor. Limited to 10 students.
M. F. Small.
This seminar will focus on one current controversy in primatology. Through readings and discussion the issues will be subject to critical evaluation. Current topics might include: social intelligence, primates as predators and prey, primate conversation, sexual selection theory, reproductive success, dominance, etc.

V. Sociocultural Anthropology

ANTHR 211 Nature and Culture @
Spring. 3 credits (4 by arrangement with instructor).
P. S. Sangren.
Cultural anthropology, because it encompasses the comparative study of humankind in society, provides a unique vantage on the nature of humanity. One of the focal questions of the discipline is the relationship between the physical/biological and symbolic/moral worlds in which we live. This inquiry places anthropology squarely at the center of social theory, since all social theories and political ideologies are founded on premises regarding human nature. Through study of a variety of issues and debates (e.g., "sociobiology," the origin and meaning of the incest tabu), this course examines a variety of past and current attempts to explain the relationships between nature and culture in human life.

ANTHR 290 Filming Other Cultures (also Theatre Arts 290) @
Spring. 3 credits. Limited to twenty students. Preference given to students who have taken either Anthropology 102 or Theatre Arts 274.
R. Ascher.
Shortly after the first films were screened, their makers saw in motion pictures a promise for greater understanding among peoples. Was the promise fulfilled? Responses to this question are examined through films and related readings, leaving ample time for discussion and the development of a critical vocabulary. The frame of reference includes: film theory, history, criticism, aesthetics and ethics; changing notions of "otherness"; the emergence of a global film culture. Fee for film screening and maintenance, $35.

ANTHR 305 Emotion, Cognition, and Culture (also Women's Studies 305) @
Fall. 4 credits.
B. J. Isbell.
This course introduces students to the current anthropological perspective on the following topics: (1) cultural shaping of emotion, (2) acquisition and production of gender and sexuality, and (3) an historical perspective on cross-cultural studies of psychology and cognition. It is appropriate for students majoring in anthropology, women's studies, psychology, cognitive studies, and human development and family studies.

ANTHR 306 Ethnographic Description
Spring. 4 credits.
J. T. Siegel.
This course shows students the nature of ethnography by showing them the practice of ethnographers. The history of anthropology indicates that it is such practice, combined with ideas from outside the discipline, that has produced significant results. Our object of study is "learning at Cornell." We will describe the contexts of learning here. Aspects of life at Cornell that may at first seem peripheral, such as boredom, music, fashion, odors, will be looked at for the role they play in education. The place of money and commodities will also be examined.

[ANTHR 313 Anthropology of the City @
Spring. 4 credits. Not offered 1992–93.]

[ANTHR 314 Applied Anthropology @
Fall. 4 credits. Not offered 1992–93.]

ANTHR 320 Myth, Ritual, and Symbol @
Spring. 4 credits.
J. Fajans.
This course examines how systems of thought, symbolic forms, and ritual practice are formulated and expressed in primarily non-Western societies. It focuses on anthropological interpretations of space, time, cosmology, myth, classificatory systems (such as color, totems, food, dress, kinship), taboo, sacrifice, witchcraft, sorcery, and rites of passage (birth, initiation, marriage, death). It will examine both the roles of specialists (spirit mediums, curers, priests, ascetics, etc.) and nonspecialists in producing these cultural forms.

ANTHR 321 Sex and Gender in Cross-Cultural Perspective (also Women's Studies 321) @
Fall. 4 credits.
K. S. March.
An introduction to the study of sex roles and the cultural construction of gender belief cross-culturally. This course examines the place of the sexes in social, political, economic, ideological, and biological systems to emphasize the diversity of gender arranagements around the world. Lectures are complemented by weekly films. Sections are limited to a maximum of eight students to facilitate discussion, feedback, and collaborative work, both in writing and in field exercises.

ANTHR 322 Magic, Myth, Science, and Religion (also Religious Studies 322) @
Fall. 4 credits.
A. T. Kirsch.
Surveys various classic anthropological perspectives on the role of religion as a cultural system in human life. Magic, myth, and ritual as cultural markers of and solutions to endemic contradictions, tensions, and transitions are explored. Inquiries into the role of science as cultural system and the present state and prospects for religion in the present and future.

[ANTHR 323 Kinship and Social Organization @
Spring. 4 credits. Not offered 1992–93.]

[ANTHR 326 Economic Anthropology @
Fall. 4 credits. Not offered 1992–93.]

ANTHR 329 Indigenous Rights, Contemporary Hunter-Gatherers, and the Nation-State @
Fall. 4 credits.
E. Povinelli.
The claims of hunter-gatherers to their traditional lands pose a unique problem for the study of indigenous rights within modern nation-states. In this course, we examine the predicaments and potential benefits that contemporary hunter-gatherer societies face when they attempt to reclaim their traditional lands. Originally portrayed as noble or ignoble savages, hunter-gatherer people struggle against distorted portraits of their social and political institutions and against encroachment onto their lands. Focusing on indigenous Americans and Australians we ask such questions as: What is the relation among land use, land needs, and land tenure? Among political power, cultural identity, and land rights? Why do indigenous claims to land present a constitutional challenge to the modern nation-state? Through the reading of theoretical essays, ethnographies, and several land-claim documents the course examines the challenge of reconciling the human and political-economic rights of indigenous and non-indigenous peoples in contemporary societies.

ANTHR 380 State, Nation, and Everyday Life
Spring. 4 credits.
J. Borneman.
This course focuses on forms of national community by exploring the interaction of the state with everyday life in different cultural contexts. We will critique the view that "the nation" is a natural, inevitable unit for organizing contemporary political and cultural order. Rather, we understand "the nation" to be a changing and contested topos of practices and identities over which both states and individuals seek control. Topics to be discussed include theoretical and historical accounts of the nation; the relation of kinship to state-building; patterns of nationness peculiar to Cold War capitalism and socialism; food and the world economy; transnational process and global culture. Our primary objective will be to denaturalize "the state" and "the nation" by establishing them as historical and cultural artifacts, products of specific interactions between peoples.

ANTHR 400 The Craft of Anthropology: Ethnographic Field Methods
Spring. 4 credits.
C. Franquemont.
An examination of the activities of anthropologists in the field: ethics, methodologies, and contingencies in observing, participating in, recording, and ultimately representing culture. This course is designed for students who plan to conduct ethnographic field research; students will conduct ethnographic practices and become familiar with the range of Cornell resources that support fieldwork, including computers, labs, and collections.

ANTHR 406 The Culture of Lives (also Women's Studies 406) @
Spring. 4 credits.
K. S. March.
This seminar will look at persons, lives, cultures, and methods in anthropological life history materials. Throughout the seminar we will attend to the evolution of interest in, forms of, and uses for life history materials in anthropology, with special attention to

differences in men's and women's lives and life (re)presentations.

[ANTHR 408 Gender Symbolism (also Women's Studies 408) @
Spring. 4 credits. Not offered 1992–93.]

ANTHR 417 Person, Gender, and Song @
Spring. 4 credits.
K. S. March.
At stake in the anthropological endeavor to represent others' worlds cannot be our capacity for communion, but rather an epistemological puzzle: how do we come to (systematize) knowledge of other realities? On the premises that we come not to know persons (directly), but among other things (through) their words, that words are contextually produced, that some contexts are more highly stylized into recognized cultural genres than others, and that a common and powerful genre is song, this seminar will look at several cases of traditional song and its relation to personal realities, with specific attention to the imaging, communicating, evaluating, and remembering of gender identities.

ANTHR 424 Anthropology Amongst the Disciplines @
Fall. 4 credits.
J. T. Siegel.
Anthropology is distinguished amongst the disciplines in depending on a notion of the not-yet conceptualized, the encounter with which is thought to provide an inassimilable element into thinking about culture and society. The course provides a history and assessment of this idea and illustrations of its embodiment, particularly in studies of ritual.

[ANTHR 427 The Anthropology of Everyday Life @
Fall. 4 credits. Not offered 1992–93.]

[ANTHR 428 Spirit Possession, Shamanism, Curing, and Witchcraft (also Women's Studies 428) @
Spring. 4 credits. Not offered 1992–93.]

ANTHR 430 Music and Ritual (also MUSIC 430 @
Fall. 4 credits.
E. Tolbert.
This seminar addresses the role of music in ritual performance. Drawing on recent work in folklore, performance studies, anthropology, and especially, ethnomusicology, the class will develop a theoretical approach to the study of music and ritual that integrates formal analysis of music with a detailed ethnography of performance. Issues explored include: music as metalanguage; music as a means of expressing and constituting identity; musical techniques of transformation, with an emphasis on trance; indigenous music theories and ethnoaesthetics; issues of formal analysis, especially music/language relationships; embodiment as a paradigm for musical symbolism; music and gender; and ritual motivation for musical symbolism. Case studies will be drawn from a wide array of ethnographic contexts.

ANTHR 436 Language, Culture, and Society @
Spring. 4 credits.
E. Povinelli.
Language is critical to the way people understand and define themselves and their reality and to the way anthropologists describe other peoples. This course examines the social activity of speaking and the importance of the study of language to anthropology. We examine language as a system of signs and structures, as an influence on cultural expression and perception, and as a tool for social cohesion, manipulation, and conflict. We ask questions such as: How do various approaches to the anthropological study of language and speech differ? To what extent does language shape our perceptions of reality, of social groups, of nations?

ANTHR 440 Health and Healing in Cultural Perspective
Spring. 4 credits.
C. Franquemont.
While this course may serve as an introduction to medical anthropology, it treats more specifically the belief systems and cultural contexts of healers, sufferers, and those who are healed. The course examines the intersection of popular belief and medical practice through attention to practitioners, their systems of practice, and the translation of healing traditions across cultures.

ANTHR 441/625 Children, Literature, and Society (also Asian Studies 451/625) @
Fall. 4 credits. Limited to 20 students.
Course offered at both undergraduate and graduate level.
S. Shiraishi.
For course description, see ASIAN 451/625.

[ANTHR 451 Anthropological Boundaries @
Fall. 4 credits. Not offered 1992–93.]

[ANTHR 452 Portraits, Profiles, and Life Histories @
Spring. 4 credits. Not offered 1992–93.]

ANTHR 453 Visual Anthropology
Fall. 4 credits. Enrollment limited by appropriate space for showing work.
S-U grades only.
R. Ascher.
The expression of ideas about the human condition through original drawings, graphics, paintings, photographs, cinema, sculpture, and video that take the *person as subject.* Writing can be combined with visual expression, as, for example, in concrete poetry or photographic essays. Projects must conform to two general guidelines: (1) the student must have prior knowledge of the medium chosen or concurrent course work in it, and (2) the project must be one that can be developed throughout the course and benefit from its particular setting. In the first half, the creative work of others is studied. For example, we read Spiegelman's MAUS and view films made by both anthropologists and the people whom they visit. The second half is devoted to hour-long progress reports and discussions of the work of people in the course. Fee for film screening and maintenance, $20.

[ANTHR 455 Theatre of Anthropology @
Spring. 4 credits. Not offered 1992–93.]

[ANTHR 460 Culture and International Order
Spring. 4 credits. Not offered 1992–93.]

VI. Area Courses

[ANTHR 230 Cultures of Native North America @#
Fall. 4 credits. Not offered 1992–93.]

[ANTHR 333 Ethnology of the Andean Region @#
Spring. 4 credits. Not offered 1992–93.]

ANTHR 335 Peoples and Cultures of Mainland Southeast Asia @
Spring. 4 credits.
A. T. Kirsch.
A survey of the peoples and cultures of Mainland Southeast Asia from prehistoric to contemporary times.

[ANTHR 336 Peoples and Cultures of the Pacific @
Fall. 4 credits. Not offered 1992–93.]

[ANTHR 339 Peoples and Cultures of the Himalayas @
Fall. 4 credits. Not offered 1992–93.]

[ANTHR 343 Religion, Family, and Community in China @
Fall. 4 credits. Not offered 1992–93.]

ANTHR 344 Male and Female in Chinese Culture and Society @
Spring. 4 credits.
P. S. Sangren.
This course explores the culture of gender, sex roles, and domestic relations in late traditional and modern Chinese society. Readings and lectures range from ethnographic descriptions of the dynamics of Chinese family life, kin relations, and socialization to representations of male and female in mythologies and ritual activities. The course also considers developments subsequent to political changes in China. Although the course's analytical focus is anthropological, readings will draw from the writings of historians and political scientists as well. A premise of the course is that understanding sex and gender in China is essential to understanding Chinese culture and its most fundamental values. The course also aims to introduce students interested in China to techniques of anthropological analysis.

ANTHR 345 Japanese Society @
Fall. 4 credits.
R. J. Smith.
A survey of the social structure of Japan and a discussion of trends in urban and rural life during the past century. Topics to be emphasized include the family, ancestor worship, community and social organization, and urbanism and modernization.

ANTHR 348 Folklore Of India (also Asian Studies 348) @
Fall. 4 credits.
A. Gold.
An examination of styles, performative contexts, and cultural meanings of India's rich and diverse oral traditions.

ANTHR 350 Topics in the Anthropology of Europe
Spring. 4 credits.
J. Borneman.
This course explores ways in which Europe can and has been studied anthropologically. Emphasis will be on understanding processes of cultural differentiation and integration. The self-understandings of various peoples of Europe is accounted for in terms of the relation of local culture to national, transnational, and global process. Among the topics to be explored: 1) the role of culture in nation-building; 2) the rise and decline of fascism and communism in the twentieth century; 3) Cold War division and everyday life; 4) the creation and displacement of culture areas (i.e., the Mediterranean, Scandinavia, *Mitteleuropa,* Slavic culture, the West, and the East).

[ANTHR 433 Andean Thought and Culture @#
Spring. 4 credits. Not offered 1992–93.]

[ANTHR 443 Religion and Ritual in Chinese Society (also Religious Studies 443) @
Fall. 4 credits. Not offered 1992–93.]

[ANTHR 448 Contemporary Approaches To South Asian Anthropology @
Fall. 4 credits. Not offered 1992–93.]

[ANTHR 456 Mesoamerican Religion, Science, and History @#
Fall. 4 credits. Not offered 1992–93.]

ANTHR 477 Ethnology of Island Southeast Asia @
Fall. 4 credits.
J. T. Siegel.
Peoples and cultures of Indonesia and the Philippines will be discussed, focusing on politics in its linguistic dimensions, as well as economic and cultural processes.

VII. Theory and History of Anthropology

In addition to the courses listed here, Anthropology 390 may also be used to satisfy the theory requirement.

ANTHR 402 Archaeological Research Design (also Archaeology 402)
Spring. 4 credits. Prerequisite: permission of instructor.
J. S. Henderson, T. P. Volman.
For course description, see ARKEO 402.

[ANTHR 404 Approaches to Archaeology (also Archaeology 404) #
Spring. 4 credits. Not offered 1992–93.]

[ANTHR 412 Contemporary Anthropological Theory @
Spring. 4 credits. Not offered 1992–93.]

[ANTHR 414 Anthropology and History
Spring. 4 credits. Not offered 1992–93.]

ANTHR 420 Development of Anthropological Thought
Spring. 4 credits.
J. Fajans.
An examination of the history and development of anthropological theory and practice. The course will focus on the differences and continuities among the various national and historical approaches that have come to be regarded as the schools of anthropology.

[ANTHR 426 Ideology and Social Reproduction @
Spring. 4 credits. Not offered 1992–93.]

VIII. Graduate Seminars

600-level courses are open to undergraduates who have fulfilled the prerequisites or by consent of the instructor.

ASIAN 601 Southeast Asia Seminar: To be announced

ASIAN 602 Southeast Asia Seminar: To be announced

[ANTHR 603 Production, Exchange and Value
Fall. 4 credits. Not offered 1992–93.]

ANTHR 607–608 Special Problems in Anthropology
607, fall; 608, spring. Credit to be arranged. Intended for graduate students only.
Hours to be arranged. Staff.

[ANTHR 610 Language of Myth (also Classics 610 and Comparative Literature 615)
Spring. 4 credits. Not offered 1992–93.]

[ANTHR 612 History of Anthropological Thought
Spring. 4 credits. Not offered 1992–93.]

NS 612 Methods of Assessing Physical Growth in Children

ANTHR 614 Reading in the Ethnographic Tradition (1880–1960)
Fall. 4 credits.
D. H. Holmberg.
This seminar examines the development of the monographic tradition within American cultural anthropology and British social anthropology. We read "classic" ethnographic texts beginning with Cushing's writings in the late nineteenth century, following with works by anthropologists such as Rivers, Boas, Radcliffe-Brown, Malinowski, Firth, Mead, Bateson, Radin, Redfield, Srinivas, Evans-Pritchard, and Leach. We also read some of the more recent literature assessing ethnographic practice and writing. This seminar alternates from year to year with Anthropology 615.

[ANTHR 615 Reading Contemporary Ethnographies (1960–1990)
Fall. 4 credits. Not offered 1992–93.]

[ANTHR 616 The Cultural Production of the Person
Spring. 4 credits. Not offered 1992–93.]

ANTHR 619 Anthropological Approaches to the Study of Buddhisms in Asia
Spring. 4 credits.
A. T. Kirsch.
This seminar will examine the various conceptual and analytical strategies employed by social scientists in the study of Buddhism especially in South and Southeast Asia. Problems of religious complexity, the social correlates of Buddhism, and the role of Buddhism in social change will be explored.

ANTHR 620 Anthropological Perspectives on Industry: Participatory Action Research and Organizational Culture
Fall. 4 credits. Limited to 20 students.
D. J. Greenwood.
A graduate seminar focused on the anthropology of industry. Each year the seminar will have a specific theoretical, methodological, or substantive focus. This year the dual focus is participatory action research and its implications for the study of organizational cultures.

ANTHR 621 Gender and Culture (also Women's Studies 621)
Fall. 4 credits. Prerequisite: concurrent attendance in the lectures and films of Anthropology/Women's Studies 321 and permission of instructor.
K. S. March.
This seminar is intended for advanced students planning further study or research on gender issues and desirous of an anthropological perspective on them. It explores the topics, questions, and readings of Anthropology/Women's Studies 321 in greater depth and with attention to the specific research interests of the participants each year.

ANTHR 625/441 Children, Literature, and Society (also Asian Studies 625/451)
Fall. 4 credits. Limited to 20 students. Course offered at both undergraduate and graduate level.
S. Shiraishi.
For course description, see ASIAN 625/451.

[ANTHR 626 Problems in Economic Anthropology
Fall. 4 credits. Not offered 1992–93.]

ANTHR 627 Seminar in Ethnobotany: To be announced (also Biological Sciences)
Fall. 4 credits.
C. Franquemont/D. Bates.
Topic, day and time to be announced.

[ANTHR 628 Political Anthropology
Spring. 4 credits. Not offered 1992–93.]

ANTHR 630 The Philosophy of Money (also Romance Studies 630)
Spring. 4 credits.
J. T. Siegel, R. Klein.
This course will examine varieties of exchange that take place in the form of money. It will focus on the following topics: Myths surrounding money and theories of its origins. The condition of its circulation: money economies versus those based on gift-giving, gambling, and prostitution. The treatment of money in psychoanalysis, its psychic and literary thematization, particularly in relation to gender, race, and anti-semitism. Anthropological material from non-Western cultures will also be introduced. Readings will include the work of Simmel, Marx, Mauss, Freud, Bataille, and Derrida.

[ANTHR 631 Kingship and Cultural Identity in Mesoamerica: Interpretive and Comparative Issues
Fall. 4 credits. Not offered 1992–93.]

[ANTHR 632 Andean Symbolism
Spring. 4 credits. Not offered 1992–93.]

[ANTHR 633 Andean Research
Fall or spring. 4 credits. Not offered 1992–93.]

ANTHR 634–635 Southeast Asia: Readings in Special Problems
634, fall; 635, spring. Credit to be arranged.
Hours to be arranged. Staff.

[ANTHR 636 Cognition and Classification
Fall. 4 credits. Not offered 1992–93.]

ANTHR 637 Anthropological Perspectives on Human Rights, Democracy, and Violence in Latin America
Spring. 4 credits.
B. J. Isbell.
The last two decades have seen an increase in democratic regimes in Latin America while at the same time human rights abuses and political violence have risen to alarming proportions. This graduate seminar will begin with an overview of these contradictory political processes in Latin America. A comparison of two countries with large indigenous populations, Peru and Guatemala, will facilitate examination of the widespread claim that ethnocide is being committed in these two "new" democracies. Graduate students may choose from a wide range of topics for research.

ANTHR 640–641 South Asia: Readings in Special Problems
640, fall; 641, spring. Credit to be arranged.
Hours to be arranged. D. H. Holmberg, K. S. March.
Selected readings in society, religion, and culture in South Asia.

ANTHR 645 Japanese Ethnology
Fall. 4 credits.
Hours to be arranged. R. J. Smith.
This seminar is designed for advanced students who plan to conduct social science research in Japan. It deals with questions of historical continuity, the relationship of the individual to society, and the nature of contemporary Japanese social organizations. A reading knowledge of Japanese is strongly recommended.

ANTHR 648 Marriage and Death
Fall. 4 credits. Limited to 20 students.
J. Borneman.
This course examines the anthropological and social historical approaches to the study of marriage and death. It focuses on the cultural and historical variability of these institutions as well as on the frequent linkage between them within the lifecourse of any particular individual. Marriage and death will be investigated thematically with regard to their ritual aspects (e.g., weddings, funerals), place within the lifecourse (e.g., rite of adulthood, passage to heaven, social death, path to privilege), relation to political systems (e.g., tribes, empires, states), and to their changing relationship to the legitimation of power and hierarchy.

[ANTHR 649 Narrative and the Analysis of Culture
Fall. 4 credits. Not offered 1992–93.]

[ANTHR 651 Anthropological Boundaries: Seminar on Film
Spring. 4 credits. Not offered 1992–93.]

ANTHR 653 Myth onto Film (also Theatre Arts 653)
Fall. 4 credits. Open to undergraduates and graduate students with permission of instructor. Enrollment limited by available studio space and equipment. Prerequisite: some knowledge of one of the following: anthropology, filmmaking, mythology, graphics, drawing, or painting.
R. Ascher.
In myths, whales fly, pebbles throw themselves across streams, and trees are transformed into women. Toward the end of visualizing myths—in particular the myths of other people—we explore the possibilities of animated film. The technique used is cameraless animation; that is, we draw and paint, frame by frame, directly onto movie film. The intellectual problem is to visualize the myths of others so that they are comprehensible to us but are not thought to be of us. Reading includes introductory works on both myth and animation and there is background reading on the particular myth that is committed to film. Fee for film screening and maintenance, $50.

[ANTHR 656 Maya History
Fall. 4 credits. Not offered 1992–93.]

[ANTHR 663 Hunters, Gatherers, and the Origins Of American Agriculture
Spring. 4 credits. Not offered 1992–93.]

ANTHR 664 Problems in Archaeology: "Early Man" in America (also Archaeology 664)
Fall. 4 credits.
T. F. Lynch.
The subject will be considered in historical perspective, as it has been dealt with by archaeologists, geographers, and paleoecologists. Emphasis will be on contextual analysis and environmental adaptations, rather than chronology, and topics will be drawn from both North and South American archaeology.

[ANTHR 665 Native American Contributions to Anthropological Thought
Spring. 4 credits. Not offered 1992–93.]

[ANTHR 666 The Discovery of America
Fall. 4 credits. Not offered 1992–93.]

ANTHR 673 Human Evolution: Concepts, History and Theory (also Biological Sciences 673)
Fall. 3 credits. Prerequisite: one year of introductory biology, Anthropology 101, or permission of instructor. Offered alternate years.
K. A. R. Kennedy.
The historical background of present-day concepts of man's evolutionary variations and adaptations in space and time is surveyed. The formation of biological anthropology as an area of scientific inquiry within the social and biological sciences is reviewed. Students select their own topics within a broad range of readings in the history of Western concepts of human origins, diversity, and place in nature.

R SOC 723 Social Movements in Agrarian Society

ARABIC AND ARAMAIC

See Department of Near Eastern Studies.

ARCHAEOLOGY

S. Baugher (city and regional planning), A. L. Bloom (geological sciences), R. G. Calkins (history of art), K. M. Clinton (Classics), J. E. Coleman (Classics), R. T. Farrell (English), J. S. Henderson (anthropology), P. I. Kuniholm (history of art), T. F. Lynch (anthropology), D. I. Owen (Near Eastern Studies), A. Ramage (history of art), B. S. Strauss (history), T. P. Volman (archaeology; director of undergraduate studies), J. Whitehead (Classics)

Archaeology is an interdisciplinary field at Cornell, which is one of the few universities in the United States to offer a separate archaeology major. Program faculty members, affiliated with several departments, coordinate course offerings and help students identify opportunities for fieldwork, graduate study, and professional positions.

The Major

Prospective majors must complete Archaeology 100 or one of the basic courses as defined below before they will be admitted to the major. This initial course will not be counted toward the major requirements.

Because the major draws on the teaching and research interests of faculty from many departments in order to present a broad view of the archaeological process, interested students should discuss their course of study with a participating faculty member as early as possible. In some areas of specialization intensive language training should be coordinated with other studies as early as the freshman year.

Once admitted to the major, students must take an additional 32 credits from the courses listed below, selected in consultation with major advisers of their choosing. These courses should provide exposure to a broad range of archaeologically known cultures and the methods of revealing and interpreting them. Sixteen of the credit hours should be at the 300 level or above. At least two courses must be taken from each of categories B-E.

Courses basic to the discipline of archaeology are marked with the word "**Basic**" after the number of credit hours. It is recommended that majors who are planning to pursue graduate studies in archaeology should take at least two of the basic courses in each category. Further courses in languages and in geology are also recommended.

Honors. Honors in archaeology is awarded on the basis of the quality of an honors essay and the student's overall academic record. Prospective honors students should have a 3.5 gradepoint in the major and a 3.0 gradepoint overall. They should consult with the director of undergraduate studies before the beginning of the senior year. The honors essay is normally prepared in consultation with a faculty adviser during the senior year; students may enroll in Archaeology 481, fall; 482, spring for this purpose.

Fieldwork. Every student should gain some practical experience in archaeological fieldwork on a project authorized by his or her adviser. This requirement may be waived in exceptional circumstances. The Jacob and Hedwig Hirsch bequest provides support for a limited number of students to work at excavations sponsored by Cornell and other approved institutions.

The Concentration

Students in Cornell schools and colleges other than Arts and Sciences may elect a concentration in archaeology. To concentrate in archaeology, the student must complete Archaeology 100 with a grade of C or better and at least four advanced courses in archaeology, distributed among the three groups stipulated in (1) in the description of the major above. Concentrators are eligible for Hirsch Scholarships in support of fieldwork.

Freshman Writing Seminars

For course descriptions, see the freshman writing seminar brochure.

A. Introductory Courses and Independent Study Courses

ARKEO 100 Introduction to Archaeology #
Spring. 3 credits.
S. Baugher.
A broad introduction to archaeology—the study of material remains to answer questions about the human past. Case studies illustrate current methods and interpretive frameworks. Guest lectures by members of the Cornell Archaeology Program are an integral part of the course.

[ARKEO 101 Introduction to Archaeology, Section
Spring. 1 credit. Limited to 35 students. Optional section to be taken concurrently with Archaeology 100. Prospective archaeology majors are encouraged to participate in this section, although it is open to all interested students. Not offered 1992–93.

A series of practical and special topics. The section includes analysis of archaeological materials, demonstrations, and visits to campus facilities.]

ARKEO 300 Individual Study in Archaeology and Related Fields
Fall or spring. Credit to be arranged. Prerequisite: Archaeology 100 or permission of instructor.
Hours to be arranged. Staff.
Students pursue topics of particular interest with the guidance of a faculty member.

ARKEO 481–482 Honors Thesis
481, fall; 482, spring. 4 credits. Prerequisite: admission to Honors Program.
Hours to be arranged. Staff.
The student, under faculty direction, will prepare a senior thesis.

ARKEO 600 Special Topics in Archaeology
Fall and spring. 4 (V) credits.
Hours to be arranged. Staff.
Students pursue advanced topics of particular interest under the guidance of a faculty member(s).

ARKEO 681–682 Master's Thesis
681, fall; 682, spring. 4 (V) credits. Limited to students admitted to Master's Program in Archaeology.
Students, working individually with faculty member(s), prepare a Master's Thesis in Archaeology.

B. Theory and Interdisciplinary Approaches

ARKEO 203 Early People: The Archaeological and Fossil Record (also Anthropology 203)
Spring. 3 credits. Basic.
T. P. Volman.
A survey of the archaeological and fossil record of human evolution. Contributions by researchers from a variety of disciplines are highlighted, as are the discoveries, personalities, and controversies that have enlivened the study of human evolution for more than a century. Critical evaluation of evidence and interpretations will be stressed. Demonstrations and films supplement the lectures.

[ARKEO 204 Ancient Civilizations (also Anthropology 204) @#
Spring. 3 credits. Basic. Not offered 1992–93.
J. S. Henderson.]

[ARKEO 317 Stone Age Archaeology (also Anthropology 317)
Spring. 4 credits. Not offered 1992–93.
T. P. Volman.
A survey of current approaches to the archaeological record of Stone Age peoples, from the earliest sites to those of recent times. Case studies are used to illustrate the nature of archaeological occurrences, excavation procedures, and analytical methods. Multidisciplinary efforts to expand our knowledge of prehistoric lifeways and behaviors are a major concern of the course.]

[ARKEO 404 Approaches to Archaeology (also Anthropology 404)
Spring. 4 credits. Basic. Prerequisite: permission of instructor. Not offered 1992–93.
J. S. Henderson, T. P. Volman.
An exploration of the concepts that have shaped modern archaeology. The course briefly examines the history of theoretical orientations in archaeology, then considers the variety of perspectives and interpretive frameworks that guide present-day investigations. Case studies illustrate the implications of the nature of the archaeological record for reconstructing subsistence and economic systems, trade, social and political organization, demography, and ideology. An undergraduate seminar especially recommended for undergraduate majors and graduate archaeologists but open to anyone with a serious interest in archaeology.]

[ARKEO 494 Seminar in Archaeology: The State (also Anthropology 494) @#
Spring. 4 credits. Not offered 1992–93.
J. S. Henderson.]

[ANTHR 663 Hunters, Gatherers, and the Origins of American Agriculture
Spring. 4 credits. Prerequisite: Anthropology 356. Open to qualified undergraduates. Not offered 1992–93.
T. F. Lynch.]

CRP 261 Urban Archaeology
Fall. 3 credits.
S. Baugher.
For description, see City and Regional Planning.

[CRP 569 Archaeology in Historic Preservation Planning
Spring. 3 credits. Not offered 1992–93.
S. Baugher.]

C. Old World Archaeology

ARKEO 221 Minoan-Mycenaean Art and Archaeology (also Classics 221 and History of Art 221) #
Fall. 3 credits. Basic. Students may not obtain credit for both this course and Classics 319.
J. Coleman.
For description, see Classics.

[ARKEO 232 Archaeology in Action I (also History of Art 224 and Classics 232) #
Fall. 3 credits. Prerequisite: permission of instructor. Not offered 1992–93.
P. I. Kuniholm.]

[ARKEO 233 Archaeology in Action II (also History of Art 225 and Classics 233) #
Spring. 3 credits. Prerequisite: permission of instructor. Not offered 1992–93.
P. I. Kuniholm.]

[ARKEO 250 Etruscan Art and Archaeology (also Classics 250 and History of Art 223) #
Fall. 3 credits. Basic. Not offered 1992–93.]

ARKEO 263 Introduction to Biblical History and Archaeology (also NES 263 and Jewish Studies 263)
Spring. 3 credits.
D. I. Owen.
For description, see Near Eastern Studies.

ARKEO 320/620 An Introduction to Early Medieval Archaeology and Culture (also English 311/603)
Spring. 4 credits. To be offered alternate years.
R. T. Farrell.
This course will cover the period 400–1100, with England and Ireland as the center of interest. Topics include the transition from late classical to medieval, the complex cultural relations between England, Ireland, the continent, and the northern world, and the relationships between documentary and artifactual evidence. The major written texts will be the *Tain, Beowulf,* and Bede's ecclesiastical history. Students will be urged to follow their interests in oral reports and brief research papers. Those taking the course for graduate credit will be expected to engage in a significant research effort. This need not be an end-term paper, but rather a series of short reports in the course of the term. Permission of instructor required for registration.

[ARKEO 432 Sardis and the Cities of Asia Minor (History of Art 432 and Classics 432) @#
Fall. 4 credits. Prerequisite: permission of instructor. Not offered 1992–93.
A. Ramage.]

[ARKEO 434 The Rise of Classical Greece (also Classics 434 and History of Art 434) #
Spring. 4 credits. Prerequisite: Classics 220 or 221 or History of Art 220 or 221 preferred. Not offered 1992–93.
P. I. Kuniholm.]

ARKEO 463 Material Culture of a Syrian City State in the Third Millennium B.C.E. (also Soc Hum 405 and Near Eastern Studies 463) @#
Fall. 3 credits.
L. Milano.
For description, see Society for the Humanities.

[CLASS 219 Mediterranean Archaeology (also Near Eastern Studies 267)
Fall. 3 credits. Basic. Not offered 1992–93; next offered 1993–94.
J. Coleman.
For description, see Classics.]

CLASS 220 Introduction to Classical Archaeology (also History of Art 220) #
Spring. 3 credits. Basic.
J. Whitehead.
For description, see Classics.

[CLASS 322 Greeks and Their Neighbors (also History of Art 328) #
Fall. 4 credits. Prerequisite: Classics/History of Art 328; Classics/History of Art 220 or Archaeology/Classics/History of Art 221, or permission of instructor. Not offered 1992–93.
J. Coleman.]

[CLASS 326 Greek Cities and Towns (also History of Art 326) #
Spring. 4 credits. Prerequisite: Classics 220 or History of Art 220. Not offered 1992–93.
J. Coleman.]

CLASS 333 Greek and Roman Mystery Cults and Early Christianity (also Religious Studies 333)
Spring. 4 credits. A previous course in Classics (civilization or language) or Religious Studies 101 is recommended.
K. Clinton.
For description, see Classics.

[CLASS 350 Arts of the Roman Empire (also History of Art 322) #
Fall. 4 credits. Prerequisite: History of Art 220 or permission of instructor. Not offered 1992–93.]

[CLASS 629 Advanced Bronze Age Archaeology (also Classics 629 and 437)
Fall. 4 credits. Prerequisite: Classics 219 or permission of instructor. Not offered 1992–93.
J. Coleman.]

[CLASS 630 Seminar in Classical Greek Archaeology: Graduate
Fall. 4 credits. Not offered 1992–93.]

[ART H 320 Arts and Monuments of Athens (also Classics 320) #
Fall. 4 credits. Prerequisite: Classics 220 or permission of instructor. Not offered 1992–93.
A. Ramage.]

[ART H 325 Greek Vase Painting (also Classics 325) #
Spring. 4 credits. Prerequisite: previous enrollment in a History of Art or Classics course or permission of instructor. Not offered 1992–93.
A. Ramage.]

[ART H 327 Greek and Roman Coins (also Classics 327) #
Fall. 4 credits. Prerequisite: History of Art 220 or permission of instructor. Not offered 1992–93.
A. Ramage.]

[ART H 427 Seminar on Roman Art and Archaeology (also Classics 435) #
Fall. 4 credits. Prerequisite: permission of instructor. Not offered 1992–93.
A. Ramage.]

[NES 243 The History and Archaeology of Ancient Israel to 450 B.C.E. @#
Spring. 4 credits. Basic. Recommended for students planning to participate in Near Eastern Studies 364, Introduction to Field Archaeology in Israel. Not offered 1992–93.
D. I. Owen.]

[NES 264 Agriculture and Society in the Ancient Near East @#
Spring. 3 credits. Not offered 1992–93.
D. I. Owen.]

[NES 367 History and Archaeology of Ancient Egypt @#
Fall. 4 credits. Basic. Not offered 1992–93.
D. I. Owen.]

D. New World Archaeology

ARKEO 493 Seminar in Archaeology: The Aztecs (also Anthropology 493) @#
Fall. 4 credits.
J. S. Henderson.
For description, see Anthropology

ARKEO 664 Problems in Archaeology: "Early Man" in America (also Anthropology 664)
Fall. 4 credits. Prerequisite: Anthropology 354. Open to qualified undergraduates.
T. F. Lynch.
For description, see Anthropology.

ANTHR 354 The Peopling of America
Fall. 4 credits. Basic.
T. F. Lynch.
For description, see Anthropology.

ANTHR 355 Ancient Mexico and Central America @#
Spring. 4 credits. Basic.
J. S. Henderson.
For description, see Anthropology.

[ANTHR 356 The Archaeology of South America @#
Spring. 4 credits. Basic. Not offered 1992–93.
T. F. Lynch.]

[ANTHR 456 Mesoamerican Religion, Science, and History @#
Fall. 4 credits. Not offered 1992–93.
J. S. Henderson.]

[ANTHR 656 Maya History
Fall. 4 credits. Not offered 1992–93.
J. S. Henderson.]

[ANTHR 666 The Discovery of America
Fall. 4 credits. Not offered 1992–93.
T. F. Lynch.]

CRP 360/666 Pre-Industrial Cities and Towns of North America
Fall. 3 credits.
S. Baugher.
For description, see City and Regional Planning.

E. Methodology and Technology

ARKEO 308 Dendrochronology of the Aegean (also History of Art 309 and Classics 309)
Fall and spring. 4 credits. Limited to 10 students. Prerequisites: Archaeology 100 or Classics 220, and permission of instructor.
P. I. Kuniholm.
For description, see History of Art.

[ARKEO 356 Practical Archaeology (also Classics 356)
Spring. 4 credits. Basic. Prerequisite: one course in archaeology. Not offered 1992–93; next offered 1993–94.
J. Coleman.
For description, see Classics.]

ARKEO 402 Archaeology Research Design (also Anthropology 402)
Spring. 4 credits. Basic. Prerequisite: permission of instructor.
J. S. Henderson, T. P. Volman.
Archaeological practice demands careful definition of research objectives and appropriate strategies before excavation or other fieldwork begins. Critical information lies in the arrangement and associations of objects and structures; this context should be a basic concern of any field investigation, particularly when it is destroyed by excavation. This course relies on case studies to illustrate how surveys, excavations, and analytical techniques must be tailored to solving specific problems. A seminar especially recommended for undergraduate majors and graduate archaeologists but open to anyone with a serious interest in archaeology.

[ARKEO 423 Ceramics (also History of Art 423 and Classics 423)
Fall. 4 credits. Prerequisite: permission of instructor. Not offered 1992–93.
A. Ramage.]

[ANTHR 371 Human Paleontology (also Biological Sciences 371)
Fall. 4 credits. Prerequisite: one year of introductory biology, Anthropology 101, or permission of instructor. Offered alternate years. Not offered 1992–93.
K. A. R. Kennedy.]

ANTHR 474 Laboratory and Field Methods in Human Biology (also Biological Sciences 474)
Spring. 4 credits. Prerequisite: one year of introductory biology, Anthropology 101, or permission of instructor.
K. A. R. Kennedy.
For description, see Biological Sciences.

ANTHR 673 Human Evolution: Concepts, History and Theory (also Biological Sciences 673)
Fall. 4 credits. Prerequisite: one year of introductory biology, Anthropology 101, or permission of instructor.
K. A. R. Kennedy.
For description, see Biological Sciences.

GEOL 441 Geomorphology
Fall. 3 credits. Prerequisites: Geological Sciences 102 or 201, or permission of instructor.
A. L. Bloom.
For description, see Geological Sciences.

[GEOL 442 Glacial and Quaternary Geology
Spring. 3 credits. Prerequisite: Geological Sciences 441 or permission of instructor. Offered alternate years. Not offered 1992–93.
A. L. Bloom.]

ASIAN AMERICAN STUDIES

See Special Programs and Interdisciplinary Studies.

ASIAN STUDIES

E. M. Gunn, chair (388 Rockefeller Hall, 255-5095); S. Akiba, B. R. Anderson, J. Badgley, R. Barker, M. G. Bernal, K. Brazell, T. Chaloemtiarana, S. Cochran, J. Cody, R. D. Colle, E. W. Coward, Jr., B. de Bary, G. Diffloth, E. C. Erickson, S. Feldman, G. Fields, J. W. Gair, M. D. Glock, D. Gold, M. Hatch, D. Holmberg, J. Jasanoff, M. Katzenstein, K. A. R. Kennedy, A. T. Kirsch, J. V. Koschmann, J. M. Law, L. C. Lee, T. Lyons, D. R. McCann, J. McRae, B. G. MacDougall, K. March, T. L. Mei, G. M. Messing, C. Minkowski, S. Mohanty, V. Nee, S. J. O'Connor, T. J. Pempel, C. A. Peterson, J. R. Piggot, T. Poleman, D. Poston, M. Rebick, N. Sakai, P. S. Sangren, C. L. Shih, T. Shiraishi, V. Shue, J. T. Siegel, R. J. Smith, K. Taylor, N. Uphoff, J. Wheatley, C. White, J. Whitman, J. U. Wolff, D. Wyatt, M. W. Young

The Department of Asian Studies encompasses the geographical areas of East Asia, South Asia, and Southeast Asia and offers courses in most of the disciplines of the social sciences and the humanities. Asian studies courses through the 400 level (ASIAN is the prefix) are taught in English and are open to all students in the university. Some of these courses may be counted toward majors in other departments; others fulfill the humanities distribution requirement. Courses listed under Asian Studies offered through other departments may fulfill distribution requirements in history, social sciences, and arts.

The Major

The applicant for admission to the major in Asian studies must have completed at least one area studies course selected from among

those listed under the Department of Asian Studies and must receive permission for admission to the major from the director of undergraduate studies. The student must have received a minimum grade of C in this course and in all other courses counted toward the major.

A student majoring in Asian studies is required to complete two courses at the 200 level (a minimum of 6 credits with a grade of C or better) in one of the Asian languages offered at Cornell. The major consists of at least 30 additional credits (which may include up to 6 credits of further language study) selected by the student in consultation with his or her adviser from among the courses listed under the Department of Asian Studies and numbered 250 and above. Majors in Asian studies normally specialize in the language and culture of one country and often choose an additional major in a traditional discipline.

Concentration in South Asia Studies

A candidate for the Bachelor of Arts or Science degree at Cornell may take a concentration in South Asia Studies by completing at least 18 credits of course work, including Asian Studies 215 (Introduction to South Asia) and four courses or seminars at the intermediate or advanced levels, two of which may be South Asian language courses.

Students taking a concentration in South Asian studies are considered members of the South Asia Program and will have an adviser from the program faculty. (This adviser will be for the student's concentration and is not a substitute for a student's academic adviser in his or her major.)

One South Asian graduate course may be taken for the concentration with consent of both the instructor and the adviser. The same applies for one South Asia-related course with a research paper on a South Asian subject. Additional courses may be added if offered with comparable South Asia content.

Concentration in Southeast Asia Studies

A candidate for the Bachelor of Arts or Bachelor of Science degree at Cornell may take a concentration in Southeast Asia studies by completing 15 credits of course work. A recommended plan would include Asian Studies 208 and three courses at the intermediate or advanced stage, two of which could be a Southeast Asian language. Students taking a concentration in Southeast Asia studies are members of the Southeast Asia Program and are assigned an adviser from the program faculty. Such students are encouraged to commence work on a Southeast Asian language. It is possible to satisfy all requirements for a concentration by studying for one semester at IKIP Malang, Indonesia; Khon Kaen University, Thailand; and Hanoi University, Vietnam; fellowships are available for undergraduates through the Cornell Abroad Program.

Distribution Requirement for Nonmajors

Humanities: any two courses in Asian art, literature, or religion given by the Department of Asian Studies or listed there under the areas of China, Japan, South Asia, and Southeast Asia, excluding only freshman writing seminars and courses given outside the College of Arts and Sciences. A reasonable sequence is formed by taking any two courses in the same area or by taking AS 208, 211, 212, 215, or 218, either using two of these courses as a sequence or by following one with a course in the humanities in that area.

Social Sciences: any two courses in Asian anthropology, economics, government, linguistics, or sociology given by the Department of Asian Studies or listed there under the areas of China, Japan, South Asia, and Southeast Asia, excluding only freshman writing seminars and courses given outside the College of Arts and Sciences. A reasonable sequence is formed by taking any two courses in the same area or by taking AS 208, 211, 212, 215, or 218, followed by a social science course in that area.

History: any two courses in Asian history given by the Department of History and listed under the Department of Asian Studies under the areas of China, Japan, South Asia, and Southeast Asia, excluding only freshman writing seminars and courses given outside the College of Arts and Sciences. A reasonable sequence is formed by taking any two courses in the same area or by taking AS 208, 211, 212, 215, or 218, followed by a history course in that area.

Honors. To be eligible for honors in Asian studies, a student must have a cumulative grade average of A- in all Asian Studies area courses, exclusive of language study only, and must successfully complete an honors essay during the senior year. Students who wish to be considered for honors should apply to the director of undergraduate studies during the second term of their junior year. The application must include an outline of the proposed project and the endorsement of a faculty adviser. During the first term of the senior year the student does research for the essay in conjunction with an appropriate Asian studies course or Asian Studies 401. Students of China and Japan must also complete Asian Studies 611 or 612, respectively. By the end of the first term the student must present a detailed outline of the honors essay and have it approved by the faculty sponsor and the director of undergraduate studies. The student is then eligible for Asian Studies 402, the honors course, which entails writing the essay. At the end of the senior year, the student has an oral examination (with at least two faculty members) covering both the honors essay and the student's area of concentration.

Intensive Language Program (FALCON)

For those students desiring to accelerate their acquisition of Chinese, Japanese, or Indonesian, Cornell offers a full-time intensive language program, the Full-Year Asian Language Concentration (FALCON). FALCON students spend six hours a day, five days a week, for periods of up to a full year studying only the language and thus are able to complete as many as twelve hundred hours of supervised classroom and laboratory work in one year. For further information, students should contact the FALCON Program Office, Department of Modern Languages and Linguistics, 203 Morrill Hall (telephone: 607/255-6457).

Study Abroad

Cornell is a member of the Inter-University Centers for Chinese Language Study in Taipei and for Japanese Language Study in Yokohama and a member of the Council on International Educational Exchange offering study in China. These centers offer intensive training in both spoken and written forms of the languages. The Kyoto Center for Japanese Studies (KCJS) is an undergraduate program for students who want to spend a year in Japan studying both language and culture.

Cornell is a class-A member of the American Institute of Indian Studies, which offers fellowships in India for intensive language study in Hindi, Bengali, and Tamil. The Intercollegiate Sri Lanka Education program (ISLE) offers an undergraduate curriculum in Sinhala, Buddhist studies, and the culture and civilization of Sri Lanka, at Peradeniya University in Kandy. Cornell also offers study abroad opportunities in South Asian studies at the School of Oriental and African Studies at the University of London. For further details, contact the South Asia Program office, 170 Uris Hall (telephone: 607/255-8923).

Cornell Abroad offers a one-semester program at the University of Xiamen in Fujian Province, China. Other opportunities include a junior year abroad at IKIP-Malang, in Indonesia, or at the School of Oriental and African Studies, University of London. Many other options for study in Asia exist, including in Thailand and Vietnam. Undergraduates should consult the Cornell Abroad Program; graduate students should inquire at the East Asia Program, the South Asia Program, or the Southeast Asia Program offices.

General Education Courses

ASIAN 208 Introduction to Southeast Asia @
Spring. 3 credits.
Staff.
This course is for anyone curious about the part of Asia with the most diversity; it defines Southeast Asia both as the nation-states that have emerged since 1945 (Brunei, Burma, Cambodia, Indonesia, Laos, Malaysia, Philippines, Singapore, Thailand, and Viet Nam) and as a larger cultural world extending from southern China to Madagascar and Polynesia. Students will find a serious, organized introduction to a variety of disciplinary and topical approaches to this region, including geography, linguistics, history, religion and ideology, anthropology, marriage and family systems, music, literacy and literature, art and architecture, agriculture, industrialization and urbanization, politics and government, warfare and diplomacy, ecological and human degradation, business and marketing. The course aims to teach both basic information and different ways of interpreting that information.

ASIAN 211 Introduction to Japan @
Fall. 3 credits.
N. Sakai.
An interdisciplinary introduction to Japanese society and its history especially designed for students not majoring in Asian Studies. The first part of the course focuses on the historical changes in Japanese society from the eighth century down to the nineteenth century; the second part analyzes modern society from a variety of perspectives. It also addresses the question of how Japan is represented in the U.S. mass media. Guest lecturers from five or six different fields offer their opinions on Japanese history, culture, and politics.

ASIAN 212 Introduction to China @
Spring. 3 credits (4 credits with a special project; consult instructor for information).
Staff.
An interdisciplinary introduction to Chinese culture especially designed for students not majoring in Asian studies.

ASIAN 215 Introduction to South Asian Civilization @
Fall. 3 credits (4 credits with a special project; consult instructor for information).
A. Gold.
An interdisciplinary introduction to the culture and history shared by India and other states of South Asia. Designed for students not majoring in Asian Studies. Guest lecturers will provide the perspective of their disciplines to the general themes of the course: cultural diversity and the role of tradition in contemporary life.

ASIAN 218 Introduction to Korea @
Spring. 3 credits. Weekly lecture and discussion meetings. Course enrollment limited to 25.
D. McCann.
A multidisciplinary introduction to Korean history and culture, including language, literature, art, and music. The course begins with an overview of Korean history from the Three Kingdoms Period to the present. The course then focuses on major events in twentieth-century Korean history: The March 1, 1919 Independence Movement, the Korean War, the 1960 Student Revolution, the 1980 Kwangju Massacre, or others. Visiting lecturers will speak about Korea from a variety of disciplinary viewpoints, including linguistics, sociology, anthropology, political science, and law.

Asia—Literature and Religion Courses

The following courses are taught entirely in English and are open to any Cornell student.

ASIAN 250 Introduction to Asian Religions (also Religious Studies 250) @#
Spring. 3 credits.
J. M. Law.
A survey of the major religious traditions of India, China, and Japan, focusing on Vedic ritual and Brahmanical Hinduism; Indian, Chinese, and Japanese Buddhism; the native Chinese traditions of Confucianism and Taoism; and Shinto, Confucianism, and the new religions in Japan. Emphasis will be on the great traditions of these cultures, with frequent reference to the differing realms of popular religions.

ASIAN 311 Modern Korean Culture and Literature
Spring. 4 credits.
D. McCann.
Modern Korean literature as expression or mediation of change in twentieth-century Korean society and culture. Topics include the Intellectual Pioneers and the Novel; Literature and Culture from the Japanese Colonial Period; the Korean War and Literature; Economic Development and Political Oppression in Post-Korean War Literature; Contemporary Writers.

ASIAN 313 The Japanese Film (also Theatre Arts 313 and Comparative Literature 313) @
Spring. 4 credits.
B. de Bary.
The course will explore the relationship between thematic and formal concerns of Japanese film and narratives of modern Japanese history dealing with such issues as the nature of the Meiji Restoration, the rise of Taisho commodity culture, the Pacific War, postwar reconstruction, postmodernity and "new nationalism." Weekly analyses of specific films will be accompanied by readings that provide historical context and/or post relevant interpretive and theoretical questions, particularly those of gender and cultural difference. Study of works by Ozu, Mizoguchi, Kurosawa, and Naruse will constitute the introductory portions of the course, followed each year by a series featuring recent works of contemporary directors.

[ASIAN 338 Democracy and War
Spring. 4 credits. Not offered 1992–93; next offered 1993–94.
D. McCann and B. Strauss.]

ASIAN 348 Folklore of India (also Anthropology 348) @
Fall. 4 credits.
A. Gold.
An examination of styles, performative contexts, and cultural meanings of India's rich and diverse oral traditions.

ASIAN 351 The Religious Traditions of India (also Religious Studies 351) @#
Fall. 4 credits.
D. Gold.
A study of the relationships between the main currents of Indian religion. The course will first focus on the Hindu tradition and its holistic worldview within the context of the caste system. It will then describe the rise of Jainism and Theravada and Mahayana Buddhism, as well as Hindu and Buddhist Tantrism, as religious phenomena reflecting the emergence of individualism.

[ASIAN 354 Buddhism in India (also Religious Studies 354) @#
Spring. 4 credits. Not offered 1992–93; next offered 1993–94.
C. Minkowski.]

[ASIAN 355 Japanese Religions: A Study of Practice (also Religious Studies 355) @
Spring. 4 credits. Not offered 1992–93.
J. M. Law.]

[ASIAN 357 Chinese Religion (also Religious Studies 357) @#
Fall. 4 credits. Not offered 1992–93.
J. McRae.]

[ASIAN 358 Buddhism in China (also Religious Studies 358) @#
Fall. 4 credits. Not offered 1992–93.]

ASIAN 359 Japanese Buddhism (also Religious Studies 359) @#
Spring. 4 credits.
J. M. Law.
This course explores a number of major dynamics in Japanese Buddhism within the context of the larger Japanese religious ethos. We will focus on the following: 1) strategies used in the introduction and spread of Buddhism in Japan, and systems of accommodation, with special attention to the *Lotus Sutra*; 2) the formulations of Buddhist doctrine and practice of four major figures in Japanese Buddhism: Saicho, Kukai, Nichiren and Dogen; and 3) understandings of Buddhist practice expressed in the "new" religions, with Reiyukai as our case. Readings are in English, with optional readings in Japanese for graduate students.

[ASIAN 371 Chinese Philosophical Literature @#
Spring. 4 credits. Not offered 1992–93; next offered 1993–94.
T. L. Mei.]

ASIAN 373 Twentieth-Century Chinese Literature @
Fall. 4 credits.
E. Gunn.
A survey of the principal works in English translation, the course introduces fiction, drama, essays, and poetry of China beginning with the Republican era and continuing up to the present in the People's Republic and Taiwan, with attention to social and political issues and literary theory.

[ASIAN 374 Chinese Narrative Literature @#
Spring. 4 credits. Not offered 1992–93.
Staff.]

ASIAN 375 Japanese Poetry and Poetic Prose @#
Spring. 4 credits. Alternates with Asian Studies 377.
K. Brazell.
An introduction (in English translation) to the great poets of premodern Japan. This course will cover court poetry, linked verse, haiku, poetic memoirs, travel diaries, and poem tales written between the eighth and eighteenth centuries.

ASIAN 376 Modern Japanese Literature: From Meiji through the Pacific War @
Fall. 4 credits.
B. de Bary.
A survey of works of Japanese fiction from the Meiji Restoration through the Showa Period.

[ASIAN 377 Japanese Narrative Literature @#
Spring. 4 credits. Alternates with AS 375. Not offered 1992–93.
K. Brazell.]

[ASIAN 378 The Postwar and the Postmodern in Japanese Literature @
Fall. 4 credits. Alternates with Asian Studies 375. Not offered 1992–93.
B. de Bary.]

[ASIAN 380 Vietnamese Literature in Translation @#
Spring. 4 credits. Not offered 1992–93; next offered 1993–94.
K. Taylor.]

[ASIAN 385 Cultural History of Vietnam @#
Fall. 4 credits. Not offered 1992–93; next offered 1993–94.
K. Taylor.]

[ASIAN 390 Comparative Sanskrit Myth and Epic (also Classics 390) @#
Fall. 4 credits. Not offered 1992–93; next offered 1993–94.
C. Minkowski.]

[ASIAN 391 Classical Indian Narrative (also Classics 391) @#
Fall. 4 credits. Not offered 1992–93; next offered 1994–95.
C. Minkowski.]

[ASIAN 393 Images of Humanity in Medieval China (also History 393) @#
Fall. 4 credits. Not offered 1992–93.
C. Peterson and J. McRae.]

[ASIAN 395 Classical Indian Philosophical Systems (also Classics 395, also Religious Studies 395) @#
Spring. 4 credits. Some background in philosophy or in classical culture is desirable, but not required. Not offered 1992–93; next offered 1994–95.
C. Minkowski.]

[ASIAN 410 Chinese Performing Arts @
Fall. 4 credits. Not offered 1992–93.
Hours to be arranged. E. M. Gunn.]

ASIAN 414 Literature and Society
Spring. 4 credits.
T. Moran.
An advanced undergraduate course designed for team teaching by China specialists discussing texts from several fields (such as history, religion, economics, city planning and architecture, and literature) and exploring the ways they have created discourses on China. Students should have sufficient prior knowledge of China to permit their contributing to this comparative discussion. Courses such as Introduction to China or more specialized courses within disciplines will count as prerequisites.

ASIAN 417 Legacy of the Cultural Revolution @
Fall. 4 credits.
T. Moran.
The aim of the course is to discuss central currents in recent Chinese social history through the lens of literature, so as to develop understanding of both the historical events and the ways in which Chinese intellectuals try to come to grips with them.

[ASIAN 421 Religious Reflections on the Human Body (also Religious Studies 421) @
Fall. 4 credits. Not offered 1992–93.
J. M. Law.]

[ASIAN 440 Meditation Schools of East Asian Buddhism (also Religious Studies 440) @#
Spring. 4 credits. Prerequisite: ASIAN 250 or equivalent. Not offered 1992–93.
Time to be arranged. J. McRae.]

ASIAN 449 History and Methods of the Academic Study of Religion (also Religious Studies 449) @#
Fall. 4 credits. Prerequisite: one course satisfying the Religious Studies major.
J. M. Law.
The first segment of this course explores the rise of the discipline of *Religionswissenschaft* in Europe in the mid-nineteenth century as a self-consciously non-sectarian and academic approach to the study of religious texts and phenomena. We explore the ways this discipline interacted with existing disciplines in the academy, giving special attention to the growing fields of sociology and anthropology. We then look at a number of assumptions inherent in this intellectual movement and focus on a) the conception of the sacred; b) the idea of rationality and c) the "discovery" and construction of non-Western religious tradition. The second segment surveys major approaches to the academic study of religion currently used today: anthropology, hermeneutics, history, history of religions, literary studies, phenomenology, sociology, and theology. For each of these cases, we will be studying how these angles on religious data both build upon the nineteenth century assumptions of *Religionswissenschaft* and address twentieth-century religious issues.

ASIAN 451/625 Children, Literature, and Society @
Fall. 4 credits.
S. Shiraishi.
This course explores the world of children and consists of three parts: (1) Children in Anthropological Studies; (2) Representations of Childhood; and (3) School and Cultural Politics. The basic underlying question behind all three approaches is how and what we, who have all once been children, can learn from children after removing the layers of adult conceptions of childhood. If "tradition" prescribes our present life, the "future" which children symbolize has the potentiality to open up the restrictions imposed on current society. Emphasis will be placed on case studies of Indonesia, other Southeast Asian countries, and Japan, but the scope will extend to immigrants' experiences as well.

[ASIAN 460 Indian Meditation Texts (also Religious Studies 460) @#
Spring. 4 credits. Not offered 1992–93.
D. Gold.
Since texts that record visionary experience, prescribe the practice of contemplation, and present enigmatic utterances are highly valued in Indian tradition, they need to be taken seriously by students of Indian and world-civilizations. Yet the special problems of interpretation that they present have often caused meditation texts to be passed over in embarrassed, sometimes reverent silence. In this course we will draw on approaches from literary criticism, anthropology, and religious studies to explore a number of the problems to which these texts give rise: In what ways are the apparent differences in experience presented in meditation texts shaped by different cosmologies and ritual practice? Do different literary genres have particular religious implications? What are the relations between convention and experience in the creation of the texts? Readings will be drawn from the Upanishads and Tantra, devotional verse in the vernaculars, and the classical meditation manuals of Hinduism and Buddhism. Some attention may be given to Indian Sufi materials. No knowledge of Indian languages is required.]

[ASIAN 470 The Japanese Noh Theater and Modern Dramatists (also Comparative Literature 470) @
Fall. 4 credits. Alternates with ASIAN 471. Not offered 1992–93.
K. Brazell.]

[ASIAN 471 Japanese Theatre (also Theatre Arts 471) @#
Fall. 4 credits. Alternates with ASIAN 470. Not offered 1992–93.
K. Brazell.]

[ASIAN 481 Translation and Identities @
Fall. 4 credits. Not offered 1992–93.
N. Sakai.]

[ASIAN 483 Internationalism, Nationalism, and Modern Japanese Discursive Space @
Spring. 3 credits. Not offered 1992–93.
N. Sakai.]

ASIAN 491 Japanese Studies: The Formation of the Field (also History 491)
Spring. 4 credits.
N. Sakai and V. Koschmann.
The course will provide both a historical introduction to and critical analysis of the constitution of Japanese studies as a "field" of postwar academic inquiry. While reading texts particularly influential in the early and contemporary formation of the field, we will consider such questions as the domestic and international contexts in which Japanese studies has been institutionalized and maintained, and the relationship between "Japan" as an object of area studies discourse and "Japan" as represented in American journalism, popular culture, and politics. Interdisciplinary and team-taught, the course will aim to introduce students to a range of methodologies and approaches developed in American Japan studies, problematizing assumptions in each case. Possibilities for cross-disciplinary research (along lines recently undertaken in areas such as feminist criticism and cultural studies, for example), will also be explored.

ASIAN 496 Tokugawa Literature and Thought @#
Spring. 4 credits.
N. Sakai.

Asia—Graduate Seminars

For complete descriptions of courses numbered 600 or above, consult the graduate faculty representative.

ASIAN 601 Southeast Asia Seminar: Indonesia
Fall. 4 credits.
T. Shiraishi and J. Siegel.

ASIAN 602 Southeast Asia Seminar: Thailand
Spring. 4 credits.
T. Kirsch and D. Wyatt.

[ASIAN 604 Southeast Asia Seminar
Not offered 1992–93.]

ASIAN 605–606 Master of Arts Seminar in East Asian Studies
605, fall; 606, spring. 2–4 credits.
Hours to be arranged. Staff.

ASIAN 607–608 The Plural Society Revisited (also Government 653)
Spring. 4 credits. 607 may be taken independently for credit; 607 is a prerequisite for 608.
B. R. Anderson.

ASIAN 611 Chinese Bibliography and Methodology
Spring. 1 credit. Prerequisite: permission of instructor. Required of honors students and M.A. candidates.
Staff.

ASIAN 612 Japanese Bibliography and Methodology
Fall. 1 credit. Prerequisite: permission of instructor. Required of honors students and M.A. candidates.
S. Akiba.

ASIAN 621 South Asia Seminar: Topic to be announced
Fall. 4 credits.

ASIAN 622 Seminar on South Asia: Topic to be announced
Spring. 4 credits.

ASIAN 650 Seminar on Asian Religions: China
2–4 credits. Prerequisite: permission of instructor.
Spring. J. McRae.

ASIAN 676 Southeast Asia Research Training Seminar
Contact the Southeast Asia Program, 120 Uris Hall, 255-2378, for more information.

ASIAN 701–702 Seminar in East Asian Literature
701, fall; 702, spring. 1–4 credits.
Hours to be arranged. Staff.

ASIAN 703–704 Directed Research
703, fall or spring; 704, fall or spring. Credit to be arranged.
Hours to be arranged. Staff.
For additional courses on Asian religion, see "Related Courses" in the China and Japan area courses listing.

Asia—General Courses

ASIAN 401 Asian Studies Honors Course
Fall. 4 credits. Intended for seniors who have been admitted to the honors program.
Hours to be arranged. Staff.
Supervised reading and research on the problem selected for honors work.

ASIAN 402 Asian Studies Honors: Senior Essay
Fall or spring. 4 credits. Prerequisite: admission to the honors program.
Hours to be arranged. Staff.
The student, under faculty direction, prepares an honors essay.

ASIAN 403–404 Asian Studies Supervised Reading
Fall, spring, or both. Credit to be arranged. Prerequisite: permission of instructor. Open to majors and other qualified students. Intensive reading under the direction of a member of the staff.
Hours to be arranged. Staff.

ASIAN 703–704 Directed Research
703, fall or spring; 704, fall or spring. Credit to be arranged.
Staff.

Literature in Chinese

CHLIT 213–214 Introduction to Classical Chinese
213, fall; 214, spring. 3 credits each term. Prerequisite: qualification in Chinese or permission of instructor. May be taken concurrently with Chinese 101–102, 201–202, 301–302.
T. L. Mei.

CHLIT 420 T'ang and Sung Poetry
Spring. 4 credits. Prerequisite: permission of instructor.
T. L. Mei.

CHLIT 421–422 Directed Study
Fall or spring. 2–4 credits each term. Prerequisite: permission of instructor.
Staff.

[CHLIT 424 Readings in Literary Criticism
Fall or spring. 4 credits. Prerequisite: permission of instructor. Not offered 1992–93.]

CHLIT 435 Chinese Buddhist Texts
Spring. 4 credits.
J. McRae.
Open to students with background in either Chinese or Japanese, this course will focus on the terminology, syntax, and religious doctrines of Buddhist texts in classical Chinese.

CHLIT 603 Seminar in Chinese Fiction and Drama
Fall. 4 credits. Prerequisite: permission of instructor.
E. M. Gunn.

[CHLIT 605 Seminar in Chinese Fiction and Drama
Fall. 4 credits. Prerequisite: permission of instructor. Not offered 1992–93.
Hours to be arranged. E. M. Gunn.]

[CHLIT 610 Chinese Cultural Criticism
Fall. 4 credits. Not offered 1992–93.
E. M. Gunn.]

CHLIT 621–622 Advanced Directed Reading: Chinese Historical Syntax
Spring. 2–4 credits. Prerequisite: permission of instructor.
Hours to be arranged. Staff.

Literature in Japanese

JPLIT 406 Introduction to Classical Japanese
Fall. 4 credits. Prerequisite: permission of instructor.
Hours to be arranged. N. Sakai.

JPLIT 421–422 Directed Readings
421, fall; 422, spring; credits to be arranged. Prerequisite: for Japanese 421, Japanese 402 or equivalent; for Japanese 422, Japanese 421 or equivalent.
Hours to be arranged. Staff.
Note: For complete descriptions of courses numbered 600 or above, consult the appropriate instructor.

JPLIT 611 Seminar in Classical Japanese Literature
Spring. 2–4 credits. Prerequisite: permission of instructor. Offered alternate years.
B. de Bary and K. Brazell.

[JPLIT 612 Seminar in Medieval Japanese Literature
Spring. 2–4 credits. Prerequisite: permission of instructor. Not offered 1992–93.
K. Brazell.]

[JPLIT 613 Seminar in Tokugawa Culture and Thought: Otherness, Text, and Body
Spring. 2–4 credits. Prerequisite: permission of instructor. Offered alternate years. Not offered 1992–93.
N. Sakai.]

[JPLIT 614 Seminar in Modern Japanese Literature
Fall or spring. 2–4 credits. Prerequisite: permission of instructor. Offered alternate years. Not offered 1992–93.
N. Sakai.]

[JPLIT 621 Advanced Readings in Pre-Modern Japanese Narrative Literature
Fall or spring. 4 credits. Prerequisite: permission of instructor. Not offered 1992–93.
Staff.]

Graduate-Level Reading Courses

[JPLIT 622 Advanced Readings in Pre-Modern Japanese Poetry
Fall or spring. Credit to be arranged. Prerequisite: permission of instructor. Not offered 1992–93.
Staff.]

[JPLIT 623 Advanced Readings in Pre-Modern Drama
Fall or spring. Credit to be arranged. Prerequisite: permission of instructor. Not offered 1992–93.
Staff.]

JPLIT 624 Advanced Readings in Modern Literature
Fall. 4 credits. Prerequisite: permission of instructor. Offered alternate years.
Hours to be arranged. B. de Bary.
Note: See courses listed under Asia—Literature and Religion Courses for Japanese literature courses in translation.

Japanese Language

See Modern Languages and Linguistics.

FALCON Program

255-6457; R. Sukle, 412 Morrill Hall, 255-0734; J. Whitman, 308 Morrill Hall, 255-0736; J. Wheatley, 416 Morrill Hall, 255–9301.

Literature in Korean

KORLIT 403 Readings in Korean Literature
Fall. 4 credits.
D. McCann.
Selected readings from modern or pre-modern Korean prose and poetry. Consent of the instructor is required.

Literature in Sanskrit

Sanskrit 251, see DMLL.

SNLIT 467–468 Reading in Sanskrit Literature: The Vedas
Spring. 3 credits. Prerequisite: permission of instructor.
C. Minkowski.
Readings in translation; readings in the original Vedic. Both courses must be taken as a sequence: 467, fall; 468, spring.

Literature in Vietnamese

[VTLIT 470 Vietnamese Literature: Cultural and Intellectual History
Fall. 4 credits. Not offered 1992–93; next offered 1993–94.
K. Taylor.]

Related Courses in Other Departments

ANTHR 313 Anthropology of the City @

ANTHR 474 Laboratory and Field Methods in Human Biology (also Bio S 474)

ANTHR 619 Anthropological Approaches to the Study of Buddhism in Asia

ANTHR 673 Human Evolution: History, Concepts and Theory (also Bio S 673)

[GOVT 348 Politics of Industrial Societies Not offered 1992–93.]

GOVT 349 Political Role of the Military

GOVT 647 Political Anthropology

GOVT 648 Graduate Seminar in Political Economy of Change: Rural Development in the World

HIST 190 Introduction to Asian Civilizations @#

HIST 191 Introduction to Asian Civilizations in the Modern Period @

[ART H 280 Introduction to Art History: Asian Traditions @#
Not offered 1992–93.]

ART H 396 The Arts of Southeast Asia @#

ART H 482 Ceramic Art of China and Southeast Asia @#

[ART H 580 Problems in Asian Art
Not offered 1992–93.]

RELST 101 Understanding the Religions of the World

SOC 497 Social Relations Seminar

Related Courses in Other Colleges

The courses listed below will count as College of Arts and Sciences credit only for Asian studies majors.

AG EC 464 Economics of Agricultural Development

AG EC 660 The World's Food

AG EC 665 Food and Nutrition Policy (ALSO Nutritional Science 685)

AG EC 763 Macro Policy in Developing Countries

ARCH 342 Architecture as a Cultural System

ARCH 445 Architecture and the Mythic Imagination

ARCH 448 The Indian Example and the Visual Tradition in Culture

[ARCH 667–668 Architecture in Its Cultural Context
Not offered 1992–93.]

[COMM 624 Communication in the Developing Nations
Not offered 1992–93.]

COMM 685 Training and Development: Theory and Practice

ILR 637 Labor Relations in Asia and the Pacific Rim

R SOC 751 Applications of Sociology to Development Programs

China—Area Courses

[ANTHR 326 Economic Anthropology @
Not offered 1992–93.]

[ANTHR 343 Religion, Family, and Community in China @
Not offered 1992–93.]

[ANTHR 443 Religion and Ritual in Chinese Society
Not offered 1992–93.]

ECON 369 Economy of China @

GOVT 347 Chinese Government and Politics @

GOVT 443/643 Socialism and the Market in China @

[GOVT 645 Politics of China
Not offered 1992–93.]

[HIST 243 China and the West before Imperialism @#
Not offered 1992–93.]

HIST 293 History of China up to Modern Times @#

HIST 294 History of China in Modern Times @

HIST 360 Early Warfare, East and West #

HIST 492 Undergraduate Seminar in Medieval Chinese History @#

[HIST 493 Self and Society in Late Imperial and Twentieth-Century China @
Not offered 1992–93.]

[HIST 494 The Japanese in Asia @
Not offered 1992–93.]

[HIST 691 Chinese Historiography and Source Materials
Not offered 1992–93.]

HIST [693]–694 Problems in Modern Chinese History

HIST 791–792 Seminar in Medieval Chinese History

[HIST 793–794 Seminar in Modern Chinese History
Not offered 1992–93.]

ART H 396 The Arts of Southeast Asia @#

[ART H 481 The Arts in Modern China @
Not offered 1992–93.]

ART H 482 Ceramic Art of China and Southeast Asia @#

SOC 545 Peasants, Market, and the State

Other courses dealing extensively with China are Architecture 667–668; History 190, 191 and 494; History of Art 280, 381, 482, 580, and 596.

China—Language Courses

CHIN 101–102 Elementary Course

CHIN 109–110 Elementary Reading

CHIN 111–112 Cantonese Elementary Course

CHIN 113–114 Cantonese Elementary Speaking

CHIN 161–162 FALCON @

CHIN 201–202 Intermediate Chinese @

CHIN 211–212 Intermediate Cantonese @

CHIN 301–302 Advanced Chinese @

CHIN 311–312 Advanced Cantonese @

[CHIN 403 Linguistic Structure of Chinese I
Not offered 1992–93.]

[CHIN 404 Linguistic Structure of Chinese II
Not offered 1992–93.]

CHIN 411–412 Readings in Modern Chinese

CHIN 413–414 Chinese Reading Tutorials

CHIN 415–416 Expository Writing in Modern Chinese

[CHIN 607 Chinese Dialect Seminar
Not offered 1992–93.]

Japan—Area Courses

ANTHR 345 Japanese Society @

ANTHR 645 Japanese Ethnology

[GOVT 334 Business and Labor in Politics
Not offered 1992–93.]

[GOVT 346 Politics in Contemporary Japan @
Not offered 1992–93.]

GOVT 605 Comparative Politics Field Seminar

HIST 191 Introduction to Asian Civilization in the Modern Period @

[HIST 192 Japan and the West
Not offered 1992–93.]

HIST 297 State, Society, and Culture in Japan to 1750 @#

HIST 298 State, Society, and Culture in Modern Japan @

[HIST 489 The Ideology of the Meiji Restoration
Not offered 1992–93.]

HIST 491 Japanese Studies: The Formation of the Field

[HIST 494 The Japanese in Asia @
Not offered 1992–93.]

HIST [797]–798 Seminar in Japanese Thought

ILR 641 Postwar Japanese Economy

ILR 645 Japanese and Korean Labor Markets

ART H 384 The Arts of Japan @#

NBA 580 Industrial Policy: Lessons for the United States from Japan and Europe

R SOC 492 Development in the Pacific Rim

Other courses dealing extensively with Japan are Anthropology 313; Architecture 667–668; Education 678; History 190 and 191; History of Art 280, 491, 580, and 596.

Japan—Language Courses

JAPAN 101–102 Elementary Course

[JAPAN 123 Accelerated Introductory Japanese
Not offered 1992–93.]

JAPAN 161–162 FALCON @

JAPAN 201–202 Intermediate Japanese Reading I @

JAPAN 203–204 Intermediate Japanese Conversation @

[JAPAN 223 Transition to Intermediate Japanese Conversation @
Not offered 1992–93.]

JAPAN 301–302 Intermediate Japanese Reading II

JAPAN 303–304 Communicative Competence @

JAPAN 341–342 Advanced Japanese for Business Purposes @

JAPAN 401–402 Advanced Japanese Reading

JAPAN 404 Linguistic Structure of Japanese

JAPAN 407–408 Oral Narration and Public Speaking

JAPAN 410 History of Japanese Language @#

JAPAN 421–422 Directed Readings

JAPAN 543–544 Intermediate Japanese for Business Purposes

JAPAN 545–546 Advanced Japanese for Business Purposes

South Asia—Area Courses

AG EC 660 The World's Food

[ANTHR 339 Peoples and Cultures of the Himalayas @
Not offered 1992–93.]

ANTHR 348 Folklore of India (also ASIAN 348) @

[ANTHR 448 Contemporary Approaches to South Asian Anthropology @
Not offered 1992–93.]

ANTHR 619 Anthropological Approaches to the Study of Buddhism in Asia

ANTHR 640–641 South Asia: Readings in Specific Problems

ARCH 342 Architecture as a Cultural System

ARCH 448 The Indian Example and the Visual Tradition in Culture

[ARCH 667–668 Architecture in Its Cultural Context
Not offered 1992–93.]

[ASIAN 215 Introduction to South Asian Civilizations @]

[ASIAN 250 Introduction to Asian Religions @#]

[ASIAN 348 Folklore of India (also ANTHR 348)]

[ASIAN 351 The Religious Traditions of India @#]

[ASIAN 354 Buddhism in India
Not offered 1992–93.]

[ASIAN 621 South Asia Seminar: Topic to be announced]

[ASIAN 622 South Asia Seminar: Topic to be announced]

BIO S 673 Human Evolution: Concepts, History, and Theory

CRP 101 The Global City

[CRP 775 Transnational Corporations and Developing Regions
Not offered 1992–93.]

[CRP 777 Theories of Development and Underdevelopment
Not offered 1992–93.]

[COMM 624 Communication in the Developing Nations
Not offered 1992–93.]

COMM 685 Training and Development

GOVT 351 India: Social and Economic Change in a Democratic Polity

GOVT 367 Politics of Development

GOVT 436 Environmental Politics

GOVT 648 The Political Economy of Change

[GOVT 651 Agrarian Change in South Asia—Politics, Society, and Culture
Not offered 1992–93.]

HIST 240 Modern S. Asia 1858–1947: Social and Political Foundations

HIST 417 Social and Political Movements in Colonial S. Asia

HIST 434 Islam in S. Asia

HIST 479 South Asia since 1947

ILR 637 Labor Relations in Asia and the Pacific Rim

[LING 619 Rigveda
Not offered 1992–93.]

LING 639–640 Introduction to Pali

LING 701–702 Directed Research

R SOC 205 Rural Sociology and International Development

R SOC 425 Gender Relations and Social Change

R SOC 492 Developments in the Pacific Rim

R SOC 751 Applications of Sociology to Development Programs

SOC 645 Rural Economy and Society

Other courses dealing extensively with South Asia are Anthropology 321 and 611; Agricultural Economics 464; Communication Arts 626; History 190 and 191; History of Art 280, 482, 580, and 596.

South Asia—Language Courses

BENGL 121–122 Elementary Bengali

BENGL 201–202 Intermediate Bengali

BENGL 203–204 Continuing Bengali

BENGL 300 Independent Study

BENGL 303–304 Advanced Bengali

HINDI 101–102 Elementary Course

HINDI 109–110 Accelerated Elementary Hindi-Urdu

[HINDI 201–202 Intermediate Hindi Reading
Not offered 1992–93.]

HINDI 203–204 Intermediate Composition and Conversation

HINDI 301–302 Advanced Readings in Hindi Literature

HINDI 303–304 Advanced Composition and Conversation

NEPAL 101–102 Elementary Course

NEPAL 201–202 Intermediate Nepali Conversation

NEPAL 203–204 Intermediate Nepali Composition

NEPAL 300 Independent Study

SINHA 101–102 Elementary Course

SINHA 201–202 Intermediate Sinhala Reading

SINHA 203–204 Intermediate Composition and Conversation

TAMIL 101–102 Elementary Course

SANSK 131/132 Elementary Sanskrit (also Classics 131/132)

SANSK 251/252 Intermediate Sanskrit (also Classics 251/252) @#

Southeast Asia—Area Courses

AG EC 664 Microeconomic Issues in Agricultural Development

AG EC 754 Sociotechnical Aspects of Irrigation (also Agricultural and Biological Engineering 754)

ANTHR 306 Ethnographic Description

ANTHR 322 Magic, Myth, Science, and Religion @

[ANTHR 334 Ethnology of Island Southeast Asia
Not offered 1992–93.]

ANTHR 335 Peoples and Cultures of Mainland Southeast Asia @

ANTHR 424 Myth, Ritual, and Sign

ANTHR 441/625 Children, Literature, and Society

[ANTHR 610 Myth and Mythology
Not offered 1992–93.]

ANTHR 619 Anthropological Approaches to the Study of Buddhism in Asia

ANTHR 628 Political Anthropology: Indonesia

ANTHR 634–635 Southeast Asia: Readings in Special Problems

GOVT 344 Government and Politics of Southeast Asia @

[GOVT 652 Political Problems of Southeast Asia
Not offered 1992–93.]

GOVT 653 Plural Societies Revisited

HIST 191 Introduction to Asian Civilization: Modern Period @

HIST 395 Southeast Asia to the Eighteenth Century @#

HIST 396 Southeast Asian History from the Eighteenth Century @

HIST 695 Early Southeast Asia: Graduate Proseminar

HIST 696 Modern Southeast Asia: Graduate Proseminar

[HIST 697 Seminar in Southeast Asian Palaeology
Not offered 1992–93.]

HIST 795–796 Seminar in Southeast Asian History

[ART H 280 Introduction to Art History: Asian Traditions @#
Not offered 1992–93.]

ART H 396 The Arts of Southeast Asia @#

ART H 482 Ceramic Art of China and Southeast Asia @#

[ART H 580 Problems in Asian Art
Not offered 1992–93.]

ART H 595 Methodology Seminar

[LING 405–406 Sociolinguistics
Not offered 1992–93.]

LING 600 Field Methods

[LING 651–652 Old Javanese
Not offered 1992–93.]

LING 653–654 Seminar in Southeast Asian Linguistics

[LING 655–656 Austronesian Linguistics
Not offered 1992–93.]

LING 657–658 Seminar in Austro-Asiatic Linguistics

LING 701–702 Directed Research

MUSIC 103 Introduction to Musics of the World @

MUSIC 245–246 History, Theory, and Practice of Gamelan @

MUSIC 445–446 Cornell Gamelan Ensemble

[MUSIC 604 Enthnomusicology: Areas of Study and Methods of Analysis
Not offered 1992–93.]

R SOC 205 Rural Sociology and International Development

Other courses dealing with Southeast Asia are Agricultural and Biological Engineering 771; Anthropology 102 and 420; Architecture 667–668; Asian Studies 250, 351, and 650; Education 685; Government 692; History 190; International Agriculture 603 and 703; Nutritional Sciences 680.

Southeast Asia—Language Courses

BURM 101–102 Elementary Course

BURM 201–202 Intermediate Burmese Reading

BURM 203–204 Intermediate Composition and Conversation

BURM 301–302 Advanced Burmese Reading

BURM 401–402 Burmese Directed Individual Study

[CEBU 101–102 Elementary Course
Not offered 1992–93.]

INDO 161–162 FALCON @

INDO 121–122 Elementary Course

INDO 123 Continuing Course

[INDO 201–202 Intermediate Indonesian Reading
Not offered 1992–93.]

[INDO 203–204 Intermediate Composition and Conversation
Not offered 1992–93.]

INDO 205–206 Intermediate Course

[INDO 300 Linguistic Structure of Indonesian
Not offered 1992–93.]

[INDO 301–302 Advanced Readings in Indonesian and Malay
Not offered 1992–93.]

INDO 303–304 Advanced Indonesian Conversation and Composition

INDO 305–306 Directed Individual Study

INDO 401–402 Advanced Readings in Indonesian and Malay Literature

[JAVA 131–132 Elementary Course
Not offered 1992–93.]

[JAVA 133–134 Continuing Course
Not offered 1992–93.]

[JAVA 203–204 Directed Individual Study
Not offered 1992–93.]

KHMER 101–102 Elementary Course

KHMER 201–202 Intermediate Khmer Reading

KHMER 203–204 Intermediate Composition and Conversation

KHMER 301–302 Advanced Khmer

KHMER 401–402 Directed Individual Study

KHMER 404 Structure of Khmer

TAGA 121–122 Elementary Course

TAGA 123 Continuing Course

[TAGA 201–202 Intermediate Tagalog Reading
Not offered 1992–93.]

TAGA 300 Linguistic Structure of Tagalog

THAI 101–102 Elementary Course

THAI 201-202 Intermediate Thai Reading

THAI 203–204 Intermediate Composition and Conversation

THAI 301–302 Advanced Thai

THAI 303–304 Thai Literature

THAI 401–402 Directed Individual Study

VIET 101–102 Elementary Course

VIET 201–202 Intermediate Vietnamese Reading

VIET 203–204 Intermediate Composition and Conversation

VIET 301–302 Advanced Vietnamese

VIET 401–402 Directed Individual Study

ASTRONOMY

Y. Terzian, chair (512 Space Sciences Building, 255-4935); M. P. Haynes, director of undergraduate studies (530 Space Sciences Building 255-0610); J. A. Burns, D. B. Campbell, D. F. Chernoff, J. M. Cordes, M. M. Davis, P. J. Gierasch, R. Giovanelli, T. Hagfors, T. L. Herter, J. R. Houck, P. D. Nicholson, C. E. Sagan, E. E. Salpeter, S. L. Shapiro, S. W. Squyres, G. J. Stacey, S. A. Teukolsky, J. F. Veverka, I. M. Wasserman.
Emeritus: T. Gold, M. O. Harwit

Cornell's astronomy faculty, research staff, and graduate students are active in diverse areas of modern astronomy ranging from theoretical astrophysics and general relativity to radio and radar astronomy, infrared and optical astronomy, and the exploration of the solar system. Cornell operates two local optical observatories, the world's largest radio telescope at Arecibo, Puerto Rico, and with two other institutions, the 200-inch optical telescope at Mt. Palomar in California.

The department offers a number of courses to satisfy a general interest in astronomy. These courses have few or no prerequisites and are not intended for the training of professional astronomers. The 100-level courses and Astronomy 201–202 are designed primarily for nonscience majors. The alternative introductory sequence Astronomy 211–212 is geared toward sophomore physical science and engineering majors and requires coregistration in beginning calculus. Astronomy 332 is designed for nonmajors as an introduction to astrophysics and requires at least one year of calculus and college physics as prerequisites. The other courses numbered below 400 have no college prerequisites at all.

Courses numbered above 400 are intended for students who have had two to three years of college physics and at least two years of college mathematics. Astronomy 440, Independent Study, permits students to engage in individual research projects under the guidance of a faculty member.

Interested students are encouraged to become members of the undergraduate Cornell Astronomy Club. The club has access to the Fuertes Observatory on campus and conducts regular observing and astrophotography sessions. All students are invited to visit the Space Sciences Building, see the exhibits on display there, and consult a faculty member about career plans or choice of courses.

The Major

The purpose of the major in astronomy is to provide in-depth knowledge and education about the nature of the universe. Astronomy relies heavily on preparation in physics and mathematics. Consequently, many courses in these fields are included as prerequisites. In preparation for the major, a student would normally elect the introductory physics sequence Physics 112–213–214 or 116–217–218 plus Physics 315 and 318 and the complementary pathway in mathematics, Mathematics 111–122–221–222 or 191–192–293–294 (or equivalent). The sophomore seminar Astronomy 233 "Topics in Astronomy and Astrophysics" will provide an introduction to current research in astronomy and astrophysics for prospective majors, but is not required of students who elect to major in astronomy after the sophomore year. Students are also urged to acquire computer literacy. Acceptance to the major will first be considered after completion of three semesters of introductory physics and mathematics and in general will require a GPA of 3.20 in physics and mathematics courses.

The major requirements stress the importance of building a strong preparation in physical science. The following upper level courses are normally required:

Physics 324, 326, 341, and 443
Mathematics 421 and 422 (or equivalent)
Astronomy 410, 431, and 432.

Students are encouraged to supplement the above courses with any astronomy, physics, or other appropriate courses at or above the 400 level. Advanced seniors can enroll in astronomy graduate courses with the consent of the instructor. Students are also encouraged to work with faculty members on independent study projects (Astronomy 440).

Honors. A student may be granted honors in astronomy upon the recommendation of the Astronomy Advisers Committee of the astronomy faculty.

Double majors. A double major in astronomy and another subject is possible in many circumstances. However, the set of courses used to fulfill the requirements for each major must be completely independent.

Concentration. Students majoring in other fields but interested in astronomy are encouraged to supplement their major with a concentration in astronomy, an option that is somewhat less intensive than a major. Normally Astronomy 431 and 432 are required for a concentration.

Distribution Requirement

The distribution requirement in physical sciences is met by A101 or A211, A102 or A212, A201, A202 or any course numbered 300 or above. None of the other 100-level courses can be used to satisfy the distribution requirements for students in the College of Arts and Sciences.

Courses

ASTRO 101 The Nature of the Universe
Fall. 4 credits. No prerequisites. Labs and discussions limited to 20 students each.
Lecs, M W F 11:15; labs, every other week: M T or W 2:30–5 or M T W or R 7:30–10 p.m.; disc, one hour every week: M or W 1:25, 2:30, 3:35, or 7:30 p.m., or T or R 2:30, 3:35, or 7:30 p.m. Y. Terzian; labs, P. D. Nicholson.
The physical nature of existence. An examination of the universe and our place in it and the possible existence of life and intelligence elsewhere in the cosmos. The nature of stars, galaxies, and quasi-stellar sources. The birth, evolution, and death of stars and the formation of the chemical elements, including discussions of supernovae, pulsars, neutron stars, and black holes. The physical state and composition of the interstellar material and its influence on the evolution of our galaxy. An introduction to the special and general theories of relativity.

The nature of time. Modern theories of cosmology and the structure and evolution of the universe.

ASTRO 102 Our Solar System
Spring. 4 credits. No prerequisites. Labs and discussions limited to 20 students each.
Lecs, M W F 11:15; labs every other week: M T or W 2:30–5 or M T W or R 7:30–10 p.m.; disc, one hour every week: M or W 1:25, 2:30, 3:35, or 7:30 p.m. or T or R 2:30, 3:35, or 7:30 p.m. J. F. Veverka; labs, P. D. Nicholson.
The evolution of our understanding of the formation and structure of the solar system will be discussed. Modern theories of the solar system will be compared with the results of the space program. The chemical basis of life and current ideas about the spontaneous appearance of life will be considered along with searches for life beyond the earth, both inside and outside the solar system.

ASTRO 103 The Nature of the Universe
Fall. 3 credits.
Identical to Astronomy 101 except for omission of the laboratory (see description above). This course does not satisfy the distribution requirement in physical sciences for students in the College of Arts and Sciences.

ASTRO 104 Our Solar System
Spring. 3 credits.
Identical to Astronomy 102 except for omission of the laboratory (see description above). This course does not satisfy the distribution requirement in physical sciences for students in the College of Arts and Sciences.

ASTRO 105 An Introduction to the Universe
Summer. 3 credits.
M–F 11:30–12:45; evening labs to be arranged. Staff.
How do we measure the size of our galaxy and the size of the universe? Is the universe round or flat? How are the stars born, why do they shine, and how do they die? What are the chemical elements, and how were they formed in stars? What are quasars, pulsars, and black holes? How was the solar system formed? What are the environments of other planets like? What is the basic structure of Earth and the other planets? Will man catastrophically alter the earth? Does life exist elsewhere in the universe? How can we find out? Each student has an opportunity to make observations with small telescopes.

ASTRO 106 Essential Ideas in Relativity and Cosmology
Summer. 3 credits. Prerequisites: high school algebra and trigonometry.
M–F 10–11:15. Staff.
Einstein's theories of special and general relativity, which brought about a fundamental change in our conceptual understanding of space and time, will be studied. Correspondence to, and conflicts with, common sense will be pointed out. Applications to various areas will be studied: in special relativity—space travel, equivalence of mass and energy, nuclear fission and fusion, and thermonuclear processes in the sun; in general relativity—motion of light and particles in curved space-time, cosmological models, and the question of whether the universe is open or closed.

ASTRO 201 Our Home in the Universe
Spring. 3 credits. Assumes no scientific background but requires a working knowledge of algebra and trigonometry. Limited to 25 students.
T R 1:25–2:40; informal labs TBA.
M. Haynes, T. Herter.
A general discussion of man's relation to the physical universe and how our view of the universe has changed from ancient to modern times. We will see how technological advances drive both theoretical and observational discoveries and how our census of objects filling the universe has expanded greatly during the last half century to include such exotica as quasars, pulsars, hot X-ray gas, and gamma-ray bursters. We will examine how the universe provides the best "laboratory" for testing our concepts of relativity, celestial mechanics, elementary particle physics, and nucleosynthesis. A detailed discussion of our understanding of the past and future history of the universe will be included, with particular emphasis on the issues that remain unresolved. Students will be required to undertake some nighttime observational work and to participate in other laboratory activities.

[ASTRO 202 Our Home in the Solar System
Fall. 3 credits. Prerequisite: some background in science. Limited to 25 students. Not offered 1992–93.]

ASTRO 211 Astronomy: Stars, Galaxies, and Cosmology
Spring. 4 credits. Intended for engineering and physical sciences freshmen. Prerequisite: introductory calculus or coregistration in Mathematics 111 or 191.
Lecs, M W F 11:15; rec, one hour each week to be arranged; plus some evening observing periods. J. Houck.
The formation and evolution of stars. Supernovae, pulsars, quasars, and black holes. The interstellar medium. The structure and evolution of galaxies. Cosmology.

ASTRO 212 The Solar System: Planets, Satellites, and Rings
Fall. 4 credits. Intended for engineering and physical sciences freshmen. Prerequisite: introductory calculus or coregistration in Mathematics 111 or 191.
Lecs, M W F 11:15–12:05; rec, one hour each week to be arranged; possible evening observing labs to be arranged. D. Campbell, P. Nicholson.
The origin of the solar system; celestial mechanics; tidal evolution; the physics and chemistry of planetary surfaces, atmospheres, and satellites; interiors; planetary rings; asteroids, comets, and meteorites; the search for other planetary systems.

ASTRO 233 Topics in Astronomy and Astrophysics
Fall. 2 credits. Prerequisites: Physics 112 and 213, Mathematics 112 and 221, or permission of instructor.
T R 1:25–2:15. M. Haynes, I. Wasserman.
A seminar course on advanced topics in astronomy and astrophysics designed for prospective astronomy majors. Content will vary from year to year, but will include topics from the fields of planetary, galactic, and extragalactic research.

ASTRO 332 Elements of Astrophysics
Spring. 4 credits. Prerequisites: calculus and Physics 213. Physics 214 strongly recommended.
Lec M W F 11:15. R. Giovanelli.
An introduction to astronomy, with emphasis on the application of physics to the study of the universe. Physical laws of radiation. Distance, size, mass, and age of stars, galaxies, and the universe; stellar evolution and nucleosynthesis. Supernovae, pulsars, and black holes. Galaxies and quasars. Introduction to cosmology. Mainly intended for students of science, engineering and science education, interested in astronomy and astrophysics.

ASTRO 410 Experimental Astronomy
Fall. 4 credits. Prerequisites: Physics 214 (or 310 or 360), Physics 325 (or co-registration) or permission of instructor. Limited to 10 students.
Hours to be arranged. J. Cordes, J. Houck.
Topics in experimental concepts in astrophysics. Major experiments will involve techniques in telescope operation, astronomical photography, CCD (charge-coupled-device) imaging, optical photometry, optical spectroscopy, and radio astronomy. Most of the experiments involve use of the 24-inch Hartung-Boothroyd Observatory. The radio astronomy experiments employ a radio telescope mounted on top of the Space Sciences Building. The laboratory covers the fundamentals of using astronomical instrumentation and performing data analysis applied to celestial phenomena, such as normal stars, neutron stars, and planetary nebulae.

ASTRO 431 Introduction to Astrophysics and Space Sciences I
Fall. 4 credits. Prerequisites: mathematics above the 200 level and physics above the 300 level; concurrent registration in Physics 341 and 443 is helpful.
T R 1:25–2:40. D. Chernoff, R. Giovanelli.
A systematic development of modern astrophysical concepts for physical science majors. Atomic and electromagnetic processes in space. Introduction to star formation, stellar structure, stellar atmospheres, and the interstellar medium. At the level of *Astrophysical Concepts*, by Harwit.

ASTRO 432 Introduction to Astrophysics and Space Sciences II
Spring. 4 credits. Prerequisite: Astronomy 431 or permission of instructor.
G. Stacey.
This course is divided into two broad topics; the astrophysics of the interstellar medium and cosmology. The interstellar medium section will cover thermal equilibrium and radiative transport in HII regions, atomic gas regions, and molecular clouds. We will also discuss the propagation of shocks in the interstellar medium in the context of expanding supernovae shells. The cosmology section will include expansion of the universe, metrics, Friedmann equations, dark matter, cosmological tests, the early universe, and the cosmological production of the elements. At the level of *Astrophysical Concepts* by Harwit.

[ASTRO 434 The Evolution of Planets
Fall. 4 credits. Not offered 1992–93.]

ASTRO 440 Independent Study In Astronomy
Fall or spring. 2–4 credits. Prerequisite: permission of instructor. Recommended: familiarity with the topics covered in Astronomy 332, 431, or 434.
Hours to be arranged. Staff.
Individuals work on selected topics. A program of study is devised by the student and instructor. Students need to fill out an independent study form, have it signed by the instructor, and register in the department office, 510 Space Sciences Building.

ASTRO 490 Senior Seminar Critical Thinking
Spring. 3 credits. Permission of instructor required.
C. Sagan.
Critical thinking in scientific and nonscientific contexts. Topics will include elements of classical logic and rhetoric, including standards of evidence. Case studies will include examples of competing hypotheses in the history of science, as well as examples from borderline science and medicine, religion, and politics. Stress will be laid on creative generation of alternative hypotheses and their winnowing by critical scrutiny. Discussion will be both qualitative and quantitative. Students from widely diverse fields will be admitted, but are expected to be well-qualified. They will be expected to assimilate an extensive reading list; the seminar itself will be devoted to the implications of the readings and the interaction of the participants.

ASTRO 509 General Relativity (also Physics 553)
Fall. 4 credits. Prerequisite: Knowledge of special relativity at the level of, for example, *Classical Mechanics*, by Goldstein.
T R 1:25–2:40. S. L. Shapiro.
A systematic introduction to Einstein's theory, with emphasis on modern coordinate-free methods of computation. Topics include: review of special relativity, modern differential geometry, foundation of general relativity, laws of physics in the presence of a gravitational field, experimental tests of gravitational theories. At the level of *Gravitation* by Misner, Thorne, and Wheeler.

ASTRO 510 Applications of General Relativity (also Physics 554)
Spring. 4 credits. Prerequisite: ASTRO 509.
S. L. Shapiro.
A continuation of Astronomy 509 with emphasis on applications to astrophysics and cosmology. Topics include: relativistic stars, gravitational collapse and black holes, gravitational waves, cosmology.

[ASTRO 511 Physics of Black Holes, White Dwarfs, and Neutron Stars (also Physics 525)
Spring. 4 credits. Not offered 1992–93.]

ASTRO 516 Galactic Structure and Stellar Dynamics
Spring. 4 credits.
D. Chernoff, I. Wasserman.
The kinematics and distribution of stars in the solar neighborhood. The dynamical structure, composition, and evolution of our galaxy. Characteristics and classifications of galaxies, galaxy groups, globular clusters, and clusters of galaxies. Theory of N-body systems, stellar encounters, collisional and violent relaxation, and stellar evaporation rates. Dynamical evolution of star clusters and associations. Theory of spiral structure. Binary and rotating star systems.

[ASTRO 520 Radio Astronomy
Fall. 4 credits. Not offered 1992–93.]

[ASTRO 521 Radio Astrophysics
Spring. 4 credits. Not offered 1992–93.]

ASTRO 523 Signal Processing and Data Analysis in Astronomy
Spring. 4 credits. Prerequisites: mathematical background equivalent to undergraduate physical science curriculum; familiarity with FORTRAN or C programming.
M W 1:25–2:40. J. Cordes.
Topics will include Fourier analysis of discrete and continuous time series, spectral analysis, parameter estimation, probability theory, Bayesian inference, stochastic processes, image formation from coherence functions. The orientation will be toward applications in observational astronomy and astrophysics. Discussion of applications such as signal detection, interferometry, image processing, scintillation theory, planetary radar, and pulsar studies.

ASTRO 525 Techniques of Optical/ Infrared and Submillimeter Astronomy
Fall. 4 credits.
M W F 10:10–11. T. Herter, G. Stacey.
Optical/infrared and submillimeter telescopes and instrumentation will be discussed and related to current research in these fields. Special emphasis will be on detector elements, instrument design and construction, data analysis, and observing procedures. Intended for students with a thorough understanding of undergraduate physics.

[ASTRO 526 Infrared and Optical Astrophysics
Spring. 4 credits. Not offered 1992–93.]

[ASTRO 555 Theory of the Interstellar Medium (also Physics 665)
Fall. 4 credits. Not offered 1992–93.]

[ASTRO 560 Theory of Stellar Structure and Evolution (also Physics 667)
Fall. 4 credits. Not offered 1992–93.]

[ASTRO 570 Physics of the Planets
Spring. 4 credits. Not offered 1992–93.]

[ASTRO 571 Mechanics of the Solar System (also Theoretical and Applied Mechanics 673)
Spring. 3 credits. Not offered 1992–93.]

[ASTRO 575 Atmospheric and Ionospheric Physics (also Electrical Engineering 585)
Fall. 3 credits. Not offered 1992–93.]

[ASTRO 576 Solar Terrestrial Physics (also Electrical Engineering 586)
Spring. 3 credits. Not offered 1992–93.]

[ASTRO 579 Celestial Mechanics (also Theoretical and Applied Mechanics 673)
Spring. 3 credits. Not offered 1992–93.]

ASTRO 590 Galaxies and the Universe
Fall. 4 credits.
M W 1:25–2:40. M. Haynes, T. Herter.
The universe, its constituents, its large-scale structure and its history, in the light of the major thrusts of extragalactic research. The morphology, photometry, dynamics, and kinematics of galaxies and their subsystems. Determination of masses, mass-to-light ratios, and the "missing mass." Activity in Seyferts, radio galaxies, and quasars. Binaries, groups, clusters, and superclusters. The extragalactic distance scale. Galaxy formation and evolution. Confrontation of cosmological theories with observational results.

[ASTRO 599 Cosmology
Fall. 4 credits. Not offered 1992–93.]

[ASTRO 620 Seminar: Advanced Radio Astronomy
Fall. 2 credits. Not offered 1992–93.]

[ASTRO 621 Seminar: Planetary Radar Astronomy
Spring. 3 credits. Not offered 1992–93.]

ASTRO 640 Advanced Study and Research
Fall or spring. Credit to be arranged.
Hours to be arranged. Staff.
Guided reading and seminars on topics not currently covered in regular courses. Students need to register in the department office, 510 Space Sciences Building.

ASTRO 660 Cosmic Electrodynamics (also Applied and Engineering Physics 608)
Spring. 2 credits.
Hours to be arranged. R. Lovelace.
Selected topics discussed in detail; the solar corona and wind; extragalactic radio sources; magnetized accretion discs and modes, and instabilities of self-gravitating systems.

[ASTRO 671 Seminar: Planetary Science
Spring. 3 credits. Not offered 1992–93.]

[ASTRO 673 Seminar: Planetary Atmospheres
Spring. 2 credits. Not offered 1992–93.]

[ASTRO 680 Seminar: Cosmic Rays and High-Energy Electromagnetic Radiation
Spring. 2 credits. Not offered 1992–93.]

[ASTRO 690 Seminar: Computational Astrophysics (also Physics 681)
Spring. 3 credits. Not offered 1992–93.]

ASTRO 699 Seminar: Theoretical Astrophysics (also Physics 665)
Fall. 2 credits.
M 2:30–4. E. Salpeter.
An informal seminar, meeting Mondays (and occasionally Wednesdays), for advanced graduate students in astronomy or physics. Topics: theories of star formation.

BIOLOGICAL SCIENCES

P. J. Bruns, director (169 Biotechnology Building, 255-5042); H. T. Stinson, associate director and director of undergraduate studies (200 Stimson Hall, 255-5233); R. M. Sparrow, biology center coordinator (Biology Center, 216 Stimson Hall, 255-3358); M. L. Cox, executive staff assistant (200 Stimson Hall, 255-6859)

Biology is a popular subject at many universities for a variety of reasons: It is a science that is in an exciting phase of development; it prepares students for careers in challenging and appealing fields such as human and veterinary medicine and environmental sciences; and it deals with the inherently interesting questions that arise when we try to understand ourselves and the living world around us. Many of the decisions we face today deal with the opportunities and problems that biology has put before us.

The major in biological sciences at Cornell is offered by the Division of Biological Sciences to students enrolled in either the College of Agriculture and Life Sciences or the College of Arts and Sciences. Student services in the division's office for academic affairs and the Behrman Biology Center are available to students from either college.

The biology major is designed to enable students to acquire the foundations in physical and life sciences necessary to understand modern biology and to pursue advanced studies in a specific area of biology. Programs of study include animal physiology and anatomy; biochemistry; botany; cell biology; ecology and evolutionary biology; general biology; genetics and development; microbiology; and neurobiology and behavior. A special program of study is available for qualified students with an interest in nutrition. Students interested in the marine sciences may consult the Cornell Marine Programs Office (G14 Stimson Hall, 255-3717) for academic advice and career counseling. For more details about the biology curriculum see the section in this catalog on the Division of Biological Sciences.

BURMESE AND CEBUANO (BISAYAN).

See Modern Languages and Linguistics.

CHEMISTRY

J. C. Clardy, chair and director of undergraduate studies (124 Baker Laboratory, 255-4174); H. D. Abruña, A. C. Albrecht, B. A. Baird, T. P. Begley, J. M. Burlitch, B. K. Carpenter, D. B. Collum, F. J. DiSalvo, G. S. Ezra, R. C. Fay, J. M. J. Fréchet, J. H. Freed, B. Ganem, R. Hoffmann, P. L. Houston, A. Kuki, R. Loring, J. E. McMurry, J. Meinwald, G. H. Morrison, L. A. Philips, H. A. Scheraga, D. Sogah, D. A. Usher, B. Widom, J. R. Wiesenfeld, C. F. Wilcox, P. T. Wolczanski, D. B. Zax

The chemistry department offers a full range of courses in physical, organic, inorganic, analytical, theoretical, bioorganic, and biophysical chemistry. In addition to their teaching interests, chemistry faculty members have active research programs. The link between teaching and research is a vital one in a continuously evolving scientific subject; it ensures that students will be provided with the most advanced information and perspectives, and affords opportunities for students to participate in research.

The Standard Major

The chemistry major at Cornell provides a great deal of flexibility and prepares students for a large variety of career options. In recent years, chemistry majors have gone on to graduate study in chemistry, medicine, law, and business management, as well as directly into positions with chemical, pharmaceutical, and other industrial companies. A major in chemistry can also provide the basis for significant work in related areas such as molecular biology, chemical physics, geochemistry, chemical engineering, materials science, solid state physics, and secondary education. The required courses for the major can be completed in three years, leaving the senior year open for advanced and independent work under the supervision of a professor.

The courses are arranged as a progression, with some (including mathematics and physics) prerequisite to those that are more advanced. During the first year, a student should normally register for general chemistry (preferably Chemistry 215–216 although Chemistry 207–208 is acceptable), mathematics, a freshman writing seminar, a foreign language if necessary, or physics. Chemistry 215–216 is aimed at those students with good preparation and a strong interest in chemistry. Students who do not know if their preparation is adequate should consult the instructor. In the second year a student should complete calculus and take physics and organic chemistry (Chemistry 359–360 is preferred to Chemistry 357–358). The second-year laboratory courses include 300, Quantitative Chemistry, if needed, and 301, Experimental Chemistry I. Chemistry 389–390, Physical Chemistry I and II, and Chemistry 302–303, Experimental Chemistry II and III, should be completed in the third year. Chemistry 410 should be completed in the third or fourth year. Advanced work in chemistry and related subjects can be pursued in the fourth year and in the earlier years as well. The opportunity for independent research is also available. All students with questions about the major are encouraged to consult the chair of the Department of Chemistry or the chair's representative. Entering students who are exceptionally well prepared in chemistry may receive advanced placement credit for Chemistry 207.

Prerequisites for admission to a major in chemistry are (1) Chemistry 215–216; or 207–208; 300; or 211–208, 300; or 103–104, 208, 300; (2) Physics 207or 112; and (3) Mathematics 111 or 191. Students are not encouraged to undertake a major in chemistry unless they have passed those prerequisite courses at a good level of proficiency. Knowledge of simple computer programming is essential. This may be achieved either by self-study (a syllabus is available) or by taking a course such as Computer Science 100. The minimum additional courses that must be completed for the standard major in chemistry are listed below.

1) Chemistry 301–302–303, 359–360 (357–358 may be substituted), 389–390, and 410
2) Mathematics 112, 213; or 122, 221–222; or 192–293–294
3) Physics 208

Potential majors electing to take Mathematics 213 are strongly urged to do so in their sophomore year to avoid scheduling conflicts with Chemistry 389 in their junior year.

The sequence described above is a basic program in chemistry that students can extend substantially in whatever direction suits their own needs and interests. Those going on to do graduate work in chemistry should recognize that these requirements are minimal and should supplement their programs, where possible, with further courses such as Chemistry 405, 605, 606, 666, and 681. Even students not planning graduate work in chemistry should consider advanced work in physics and mathematics, courses in the biological sciences, and advanced work in chemistry as possible extensions of the basic program.

Honors. The honors program in chemistry offers superior students an opportunity to study independently in seminars and to gain additional experience by engaging in research during the senior year. It is particularly recommended to those who plan graduate work in chemistry. Prospective candidates should complete the introductory organic chemistry and physical chemistry sequences by the end of the junior year. However, failure to have completed those courses in the junior year does not in itself disqualify a student from the honors program. Completion of the program at a high level of performance leads to the degree of Bachelor of Arts with honors in chemistry. Students will be admitted to the program by invitation of the department. Selection will be based on a superior cumulative average, including chemistry grades, and good performance in a prior research program.

Prospective candidates should discuss their plans with advisers by March 1 of their junior year. Participants are notified by early January of their senior year. To be awarded honors, candidates must show outstanding performance in at least 8 credits of undergraduate research such as is offered in Chemistry 421, 433, 461, or 477. In addition, superior performance, including the writing of a thesis, in the honors seminar (Chemistry 498) is expected.

The Alternative Major

The alternative major is a flexible program that provides core coverage of chemistry around which students can design a program to meet their own career goals. Requirements consist of a core program along with four additional courses chosen by the student. One of the four must be in chemistry at the 300 level or above; the other three may be in another field but should represent a cohesive plan and must be approved by a departmental committee.

The Core Program for the Alternative Major

1) Chemistry 215–216 (or 207–208, 300; or 211, 208, 300; or 103, 208, 300); 253, 251, 287, 289, and 410 (Chem 357–358 or 359–360 can be substituted for Chem 253, or Chem 389–390 can be substituted for Chem 287, thereby fulfilling the requirement for an additional chemistry course)
2) Mathematics 111–112; or 111, 122; or 191–192
3) Physics 207–208; or 112, 213

Additional Courses for the Alternative Major

Possible plans for the remaining three courses might include programs in Biochemistry; Biology; Physics; Computer Science; Polymers; Materials Science; Science, Technology, and Society; History and Philosophy of Science and Technology; Business and Management; Economics; Education; and others.

Premedical students and those interested in pursuing double majors might find the alternative major particularly attractive. The course requirements for admission to the alternative major are the same as those for the standard major.

Program for Science Teachers

Chemistry majors who wish to become teachers will be interested to know that Cornell University offers a certification program for teachers of secondary (grades 7–12) science. Interested students apply to the program during their sophomore or junior years. If accepted, students integrate some course work in Education with the rest of their undergraduate studies. All chemistry majors who enter this program will remain in the College of Arts and Sciences to complete the major.

After earning the bachelor's degree, certification students enter the Graduate Field of Education to complete a fifth year of study at Cornell. Following this fifth year, students are eligible for a master's degree from Cornell and a teaching certificate from New York State. Financial support is available for qualified applicants. Additional information is available from Susan Blish, 106 Kennedy Hall, 255-9255 or Prof. Deborah Trumbull, 426 Kennedy Hall, 255-3108.

Laboratory Course Regulations

Students registered for laboratory courses who do not appear at the first meeting of the laboratory will forfeit their registration in that course.

Students and members of the teaching staff are required to wear safety goggles and lab aprons in all chemistry laboratories. Students are reminded to take their goggles and lab aprons to the first laboratory session. Those who fail to cooperate with the safety program will be asked to leave the laboratories.

Students are required to pay for glassware and any other items broken or missing from their laboratory desks at the close of each semester. Students who fail to inventory their desks at the appointed time in the presence of their instructor are charged a $10 fee in addition to charges for any breakage.

Courses

Preliminary examinations for all courses may be given in the evening.

CHEM 103–104 Introduction to Chemistry
103, fall or summer; 4 credits. 104, spring or summer; 3 credits. Enrollment limited. Prerequisite for Chemistry 104: Chemistry 103. Recommended for students who have not had high school chemistry and for those needing a less mathematical course than Chemistry 207–208.

Lecs, M W 11:15; lab, T or R 8–11, or F 10:10–1:10, or M W or F 1:25–4:25. Prelims: 7:30–9 p.m., Oct. 6, Nov. 12, March 4, April 20. Fall: R. Hoffmann & D. Sogah; spring: D. A. Usher.

An introduction to chemistry, with emphasis on the important principles and facts of inorganic and organic chemistry.

CHEM 203 Strategies in Science: The World of Chemistry
Spring. 3 credits. This course plus Chemistry 103 or 207 or 211 satisfies the College of Arts and Sciences physical science distribution requirement. Chemistry 203 also satisfies the C.A.L.S. physical science requirement of one course in chemistry.

Lecs and discs: M W F 12:20. Prelims: 7:30–9 p.m., March 9, April 15. B. Ganem.

A general appreciation of chemistry in the everyday world which will highlight for nonscientists the way the scientific method works. Using several case studies, the course will focus not only on what modern chemistry has accomplished, but more generally on the way scientists think, how they function, what their *modus operandi* is. Selected topics include (a) the chemistry of food, food additives, and the effect of diet on health; (b) drugs and medicines; (c) air and water pollution, pesticides, herbicides, acid rain, and other environmental chemistry; (d) the chemistry of plastics, polymers, and other modern materials; (e) the chemistry of taste and smell, including flavors, perfumes, and cosmetics; and (f) biotechnology and genetic chemistry. Other topics to be discussed are the influence of the media on scientific issues, the decision-making process in science, scientific publishing, and fraud in science.

CHEM 207–208 General Chemistry
207, fall or summer; 208, spring or summer. 4 credits each term. Enrollment limited. Recommended for those students who will take further courses in chemistry. Prerequisite for Chemistry 207: high school chemistry. Prerequisite for Chemistry 208: Chemistry 207 or 103–104.

Lecs: fall, T R 10:10 or 12:20; spring, T R 10:10 or 12:20. Lab: fall, T R 8–12 or M T W R or F 12:20–4:25; spring, T R 8–12 or M T W R or F 12:20–4:25. Prelims: 7:30–9 p.m., Sept. 22, Oct. 22, Nov. 24, March 2, April 15. Fall: J. E. McMurry; spring: R. Hoffmann.

The important chemical principles and facts are covered, with considerable attention given to the quantitative aspects and to the techniques important for further work in chemistry. Second-term laboratory includes a systematic study of qualitative analysis.

Note: Entering students exceptionally well prepared in chemistry may receive advanced placement credit for General Chemistry by demonstrating competence in the advanced placement examination of the College Entrance Examination Board or in the departmental examination given at Cornell before classes start in the fall.

CHEM 211 Chemistry for the Applied Sciences
Fall or spring. 4 credits. Recommended for those students who intend to take only one term of chemistry. Enrollment limited. Prerequisite: high school chemistry or permission of instructor. Corequisite: a calculus course at the level of Mathematics 111 or 191.

Lecs: fall, M W F 12:20; spring, M W F 10:10. Lab: fall, M T W R F 1:25–4:25; spring, M T W R F 1:25–4:25. Prelims: 7:30–9 p.m., Sept. 22, Oct. 22, Nov. 24, Feb. 18, March 16, April 20. Fall: B. Widom; spring: P. T. Wolczanski.

The important chemical principles and facts are covered with the objective of understanding the role of chemistry in other fields. Emphasis is on topics such as solid-state materials, periodic trends, and specific classes of compounds, such as polymers.

Note: Entering students exceptionally well prepared in chemistry may receive advanced placement credit for General Chemistry by demonstrating competence in the advanced placement examination of the College Entrance Examination Board or in the departmental examination given at Cornell before classes start in the fall.

CHEM 215–216 General and Inorganic Chemistry
215, fall; 216, spring. Fall, 4 credits; spring, 5 credits. Recommended for students who intend to specialize in chemistry or in closely related fields. Enrollment limited. Prerequisites: good performance in high school chemistry and physics and in mathematics SAT. Corequisite: a calculus course at the level of Mathematics 111 or 191 for students who have not taken high school calculus. Prerequisite for Chemistry 216: Chemistry 215.

Fall: lecs, M W F 12:20; lab, M T W R or F 1:25–4:25. Spring: lecs, M W F 12:20; two labs, M W 1:25–4:25, T R 10:10–1:10 or T R 1:25–4:25. Prelims: 7:30–9 p.m., Sept. 29, Oct. 22, Nov. 19, Feb. 18, March 16, April 20. Fall: P. L. Houston; spring: R. C. Fay.

An intensive systematic study of the laws and concepts of chemistry, with considerable emphasis on quantitative aspects. Second term includes systematics of inorganic chemistry. Laboratory work covers both qualitative and quantitative analysis.

CHEM 222 Molecular Messengers in Nature
Spring. 3 credits. Prerequisite: one year of high school chemistry, Chemistry 103 or 207, or permission of instructor.

Lecs, M W F 11:15. J. Meinwald.

Organisms communicate with one another in nature chiefly by means of chemical signals. We will examine this intriguing mode of communication as it applies to a wide variety of species ranging from bacteria to insects and mammals, including humans. Essential concepts of organic chemistry and biology will be introduced and illustrated. Each student will be expected to prepare a term paper, and there will be an opportunity for oral presentation of some of these papers for class discussion.

CHEM 251 Introduction to Experimental Organic Chemistry
Fall, spring, or summer. 2 credits. Recommended for non-chemistry majors. Enrollment limited. Prerequisites: Chemistry 208 and coregistration in Chemistry 253 or 357; or Chemistry 104 and 253 with a grade of C or better. Students who have taken Chemistry 104 must complete Chemistry 253 before taking Chemistry 251.

Lecs: fall, M or F 8:00; spring, F 11:15 (all students attend first lecture); lab, M T W R or F 1:25–4:25, or T or R 8–11. Prelims: 7:30–9 p.m., Fall: Oct. 8, Nov. 12. Spring: 11:15 a.m. Feb. 26, April 16. S. Russo.

Introduction to the synthesis, separation, and handling of materials, including applications of many types of chromatography, simple and fractional distillation, crystallization, extraction, and others.

CHEM 252 Elementary Experimental Organic Chemistry
Spring or summer. 2 credits. Recommended for non-chemistry majors. Prerequisite: Chemistry 251.

Lec, M 8:00; lab, M T W or R 1:25–4:25. Prelims: 8 a.m., March 1, April 19. S. Russo.

A continuation of Chemistry 251.

CHEM 253 Elementary Organic Chemistry
Fall or summer. 4 credits. Primarily for students in the biological curricula. Prerequisite: Chemistry 104 with grade of C or better or Chemistry 208 or 216.
Lecs, M W F S 10:10. Prelims: 7:30–9 p.m., Sept. 24, Oct. 20, Nov. 17.
D. A. Usher.
The occurrence and properties of organic molecules and the mechanisms of organic reactions, including a brief introduction to the organic chemistry of biological systems.

Note: Because of duplication of material, students are not permitted to earn both 4 credits for Chemistry 253 and 3 credits for Chemistry 357. In special situations (consult instructor for details), students should take Chemistry 255 for 2 credits after having earned 3 credits for Chemistry 357. Students may earn 6 credits by taking Chemistry 251–253 or 8 credits by taking Chemistry 357, 358 and 251 or 253, 251, and 252.

CHEM 255 Elementary Organic Chemistry
Fall or summer. 2 credits.
Same course as Chemistry 253, but to be taken for reduced credit by students already having 3 credits for Chemistry 357.

CHEM 287–288 Introductory Physical Chemistry
287, fall; 288, spring. 3 credits each term. Prerequisites: Chemistry 208 or 216 and Mathematics 111–112, or permission of instructor. Prerequisite for Chemistry 288: Chemistry 287 or 389.
Lecs, M W F 9:05; rec, M or W 1:25, T 9:05. Prelims: 7:30–9 p.m., 287: Oct. 1, Nov. 5, Dec. 1. 288: Feb. 18, March 18, April 22. Fall: A. Kuki; spring: B. A. Baird.
A systematic treatment of the fundamental principles of physical chemistry, focusing in the fall on thermodynamics and the quantum mechanics of the periodic table and chemical bonding. In the spring the course will be oriented to the application of physical chemistry to biological systems. Chemistry 287 satisfies the minimum requirement for physical chemistry in the alternative chemistry major.

CHEM 289–290 Introductory Physical Chemistry Laboratory
289, fall; 290, spring. 2 credits each term.
Lecs: fall, R 8 a.m.; spring, R 9:05 lab: fall, M T 1:25–4:25; spring, M T W R F 1:25–4:25. Prelims: 8 a.m., fall: A. C. Albrecht; spring: J. H. Freed.
Quantitative and qualitative methods basic to the experimental study of physical chemistry.

CHEM 300 Quantitative Chemistry
Fall. 2 credits. Prerequisite: Chemistry 208 or advanced placement in chemistry.
Lec, F 12:20; lab, M T W R 12:20–4:25 or R 8–12. Lab includes one-hour rec. Prelims: 12:20, Oct. 9, Nov. 20. J. M. Burlitch.
Gravimetric, volumetric, spectrophotometric, and potentiometric methods are emphasized. Lectures and problem sets stress the relationship between theory and applications.

CHEM 301 Experimental Chemistry I
Spring. 4 credits. Prerequisites: Chemistry 216 or 300, and 253 or 357 or 359.
Lecs, M W F 8; 2 labs, M W 1:25–4:25 or T R 8–11 or 1:25–4:25. Prelims: 8 a.m., Feb. 24, April 9. C. F. Wilcox.
An introduction to the techniques of synthetic organic chemistry. A representative selection of the most important classes of organic reactions will be explored in the laboratory. The theoretical basis for these reactions and for the separation techniques used will be discussed in the lectures.

CHEM 302 Experimental Chemistry II
Fall. 4 credits. Enrollment limited; preference given to chemistry majors. Prerequisite: Chemistry 301.
Lecs, M W F 9:05; 2 labs, M W 1:25–4:25, or T R 1:25–4:25. C. F. Wilcox.
Instrumental methods of analysis, including optical spectroscopy, atomic absorption, NMR, mass spectrometry, gas chromatography, IR/GC/MS, and electrochemical methods.

CHEM 303 Experimental Chemistry III
Spring. 4 credits. Each lab limited to 24 students. Prerequisites: Chemistry 302, 389, 390; coregistration in the latter is permissible.
Lecs, M W F 9:05; 2 labs, M W 1:25–4:25, or T R 9:00–12:00 or T R 1:25–4:25.
D. B. Zax.
An introduction to measurement strategies in physical chemistry as applied to kinetics, spectroscopy, the dynamics of photo-excited states, and the dielectric properties of matter. The principles and assembly of electronic, optic, computer, and vacuum line equipment will be studied. A familiarity with computer programming is assumed.

CHEM 357–358 Introductory Organic Chemistry
357, fall; 358, spring. 3 credits each term. Prerequisite for Chemistry 357: Chemistry 208 or 216 or advanced placement; recommended: concurrent registration in Chemistry 251 or 300. Prerequisite for Chemistry 358: Chemistry 357; recommended: concurrent registration in Chemistry 252 or 301.
Lecs, M W F 9:05; optional rec may be offered. Prelims: 7:30–9 p.m., Sept. 24, Oct. 20, Nov. 17, Feb. 18, March 16, April 20. Fall: J. Meinwald; spring: D. Y. Sogah.
A systematic study of the more important classes of carbon compounds—reactions of their functional groups, methods of synthesis, relations, and uses.

Note: Because of duplication of material, students are not permitted to earn both 4 credits for Chemistry 253 and 3 credits for Chemistry 357. In special situations (consult instructor for details), students should take Chemistry 255 for 2 credits after having earned 3 credits for Chemistry 357. Students will not be permitted to take Chemistry 358 after completing Chemistry 253.

CHEM 359–360 Organic Chemistry I and II
359, fall; 360, spring. 4 credits each term. Recommended for students who intend to specialize in chemistry or closely related fields. Enrollment limited. Prerequisites: Chemistry 216 with a grade of B or better, Chemistry 208 with a grade of A or better, or permission of instructor. Prerequisite for Chemistry 360: Chemistry 359. Recommended: coregistration in Chemistry 300–301–302.
Lecs, M W F 9:05; makeup lec, W 7:30 p.m. Prelims: 9:05 a.m., Sept. 25, Oct. 23, Nov. 23, Feb. 10, March 10, April 16. Fall: B. K. Carpenter; spring: J. M. J. Fréchet.
A rigorous and systematic study of organic and organometallic compounds, their structures, the mechanisms of their reactions, and the ways they are synthesized in nature and in the laboratory.

CHEM 389–390 Physical Chemistry I and II
389, fall; 390, spring. 4 credits each term. Prerequisites: Mathematics 213 or, ideally, 221–222; Physics 208; Chemistry 208 or 216 or permission of instructor. Prerequisite for Chemistry 390: Chemistry 389.
Lecs, M W F 10:10; rec, M or W 1:25, or T 9:05. Prelims: 7:30–9 p.m., 389: Oct. 1, Nov. 5, Dec. 1. 390.1: Feb. 23, April 8, April 29. 390.2: Feb. 18, March 16, April 20. Fall: R. F. Loring; spring: 390.1: P. L. Houston, 390.2: M. Duncan.
The principles of physical chemistry are studied from the standpoint of the laws of thermodynamics, kinetic theory, statistical mechanics, and quantum chemistry. In the spring, there will be two lectures; lecture 02 will be for engineering students only.

[CHEM 405 Techniques of Modern Synthetic Chemistry
Spring. 3 or 6 credits. Not offered 1992–93. Enrollment limited. Prerequisites: Chemistry 302 *and* permission of instructor. To receive three credits, students must perform a minimum of three two-week experiments. Six credits will be given for three additional experiments. Completion of five exercises in elementary glass-blowing will count as one experiment.
Lab time required: 16 hours each week, including at least two 4-hour sessions in one section (M W 1:25). First meeting will be at 1:30 on first class day of semester. Lec, first week only, at times to be arranged. J. M. Burlitch.
The syntheses of complex organic, organometallic, and inorganic molecules are carried out with emphasis on the following techniques: vacuum line, high pressure, high-temperature solid state, inert atmosphere, nonaqueous solvents, radioactive labeling, sol-gel, photochemical and electrochemical methods, solid phase peptide synthesis, and polymer synthesis. Elementary glassblowing.]

CHEM 410 Inorganic Chemistry
Fall. 4 credits. Prerequisites: Chemistry 253, 358 or 360, and 287 or 390.
Lecs, M W F 11:15. F. J. DiSalvo.
A systematic study of the synthesis, structure, bonding, and reactivity of inorganic and organometallic compounds.

CHEM 421 Introduction to Inorganic Chemistry Research
Fall or spring. 2–4 credits. Prerequisites: Chemistry 303 and 389–390, or Chemistry 287–288, and Chemistry 289–290 with an average of B– or better, or permission of instructor. Selected faculty.
Research in inorganic chemistry involving both laboratory and library work, planned in consultation with a faculty member.

CHEM 433 Introduction to Analytical Chemistry Research
Fall or spring. 2–4 credits. Prerequisites: Chemistry 303 and 390 with an average of B– or better or permission of instructor. Selected faculty.
Research in analytical chemistry involving both laboratory and library work, planned in consultation with a faculty member.

CHEM 461 Introduction to Organic Chemistry Research
Fall or spring. 2–4 credits. Prerequisites: Chemistry 302 and 358 or 360 with a grade of B– or better or permission of instructor. Selected faculty.

Research in organic chemistry involving both laboratory and library work, planned in consultation with a faculty member.

CHEM 477 Introduction to Physical Chemistry Research
Fall or spring. 2–4 credits. Prerequisite: Chemistry 390 with an average of B– or better or permission of instructor. Selected faculty. Research in physical chemistry involving both laboratory and library work, planned in consultation with a faculty member.

CHEM 498 Honors Seminar
Spring. No credit. Admission by departmental invitation. Additional prerequisites or corequisites: outstanding performance in either (1) two coherent 4-credit units of research in a course such as Chemistry 421, 433, 461, or 477; or (2) one 4-credit unit in a course such as Chemistry 421, 433, 461, or 477 and summer research equivalent to at least 4 credits in the same subject.
W 2:30–4. R. F. Loring.
Informal presentations and discussions of selected topics in which all students participate. Individual research is on advanced problems in chemistry or a related subject under the guidance of a faculty member, culminating in a written report.

CHEM 600–601 General Chemistry Colloquium
600, fall; 601, spring. No credit. Required of all graduate students except those majoring in organic or bioorganic chemistry. Juniors and seniors are encouraged to attend.
R 4. L. Philips.
A series of talks representative of all fields of current research interest in chemistry other than organic chemistry, given by distinguished visitors and faculty members.

CHEM 605 Advanced Inorganic Chemistry I: Symmetry, Structure, and Reactivity
Fall. 4 credits. Prerequisite: Chemistry 389–390 or equivalent or permission of instructor.
Lecs, M W F 11:15. R. C. Fay.
Selected topics in structure, bonding, and reactivity of inorganic compounds with emphasis on main group elements; at the level of *Chemistry of the Elements*, by Greenwood and Earnshaw. Group theory applications: hybrid orbitals, molecular orbitals, molecular vibrations, and ligand field theory; at the level of Cotton's *Chemical Applications of Group Theory*.

CHEM 606 Advanced Inorganic Chemistry II: Synthesis, Structure, and Reactivity of Inorganic and Organotransition Metal Compounds
Fall. 4 credits.
Lecs, M W F 10:10. P. T. Wolczanski.
Synthesis, structure, and reactivity of coordination compounds and organometallic complexes. Emphasis on bonding models, structure, and reactivity, including the elucidation of mechanisms. Readings at the level of Purcell and Kotz's *Inorganic Chemistry*, and Collman, Hegedus, Finke, and Norton's *Principles and Applications of Organotransition Metal Chemistry*.

CHEM 607 Advanced Inorganic Chemistry III: Solid-State Chemistry
Spring. 4 credits. Prerequisite: Chemistry 605 or permission of instructor.
Lecs, M W F 12:20. F. J. DiSalvo.
The third of a three-term sequence. Interdisciplinary approach to solids. Topics include solid-state structure and X-ray diffraction, synthesis methods, defects in solids, phase diagrams, electronic structure, and chemical and physical properties of solids. Text: *Solid State Chemistry and Its Applications*, by West. Readings from inorganic chemistry and solid-state physics texts.

[CHEM 622 Chemical Communication (also Biological Sciences 623)
Fall. 4 credits. Limited to 30 students. Prerequisites: Chemistry 358 or 360 and Biological Sciences 102. Intended primarily for research-oriented students. Offered alternate years. Not offered 1992–93.
Lecs, M W F 1:25. J. Meinwald, T. Eisner.
The production, transmission, and reception of chemical signals in communicative interactions of animals, plants, and microorganisms. Communication involving insects is emphasized. Specific topics are treated, with varying emphasis on chemical, biochemical, neurobiological, ecological, and evolutionary principles.]

CHEM 625 Advanced Analytical Chemistry I
Fall. 4 credits. Prerequisite: Chemistry 288 or 390 or equivalent.
Lecs, M W F 9:05; problem sessions, W 8:00 p.m. D. B. Zax.
The application of molecular spectroscopy to chemical problems. Topics in infrared, NMR, and mass spectroscopy are discussed.

[CHEM 627 Advanced Analytical Chemistry II
Spring. 3 credits. Primarily for graduate students. Prerequisite: Chemistry 288 or 390 or equivalent. Not offered 1992–93.
Lecs, T R 10:10; problem sessions and exams, T 7:30 p.m.
Modern analytical methods for molecular characterizations, including electron, Mossbauer, and Fourier spectroscopy; mass spectrometry; methods applicable to macromolecules; information theory.]

[CHEM 628 Advanced Analytical Chemistry III (also Nutritional Sciences 690)
Spring. 3 credits. Primarily for graduate students. Prerequisite: Chemistry 288 or 390 or permission of instructor. Not offered 1992–93.
Lecs, T R 10:10.
Modern trace, micro, and surface methods of analysis, including atomic spectrometry, solids mass spectrometry, high precision isotope ratio techniques, activation analysis, microscopic, microprobe, and electron spectroscopy. Applications to biological and solid state problems.]

CHEM 629 Electrochemistry
Spring. 4 credits. Primarily for graduate students and upperclass undergraduates. Prerequisite: Chemistry 390 or equivalent (Mathematics 213 helpful).
Lecs, T R 8:40–9:55. H. D. Abruña.
Fundamentals and applications of electrochemistry. Topics will include the fundamentals of electrode kinetics, electron transfer theory, the electrical double layer, and diffusion. A wide range of techniques and their application as well as instrumental aspects will be covered.

CHEM 650–651 Organic and Organometallic Chemistry Seminar
650, fall; 651, spring. No credit. Required of all graduate students majoring in organic or bioorganic chemistry. Juniors and seniors are encouraged to attend.
M 4. T. Begley.
A series of talks representative of all fields of current research interest in organic and organometallic chemistry, given by research associates, faculty members, and distinguished visitors.

CHEM 665 Advanced Organic Chemistry
Fall. 4 credits. Primarily for graduate students and upperclass undergraduates. Prerequisites: Chemistry 253 or 358 or 360, and 390 or equivalents or permission of instructor.
Lecs, M W F 12:20. B. Ganem.
A survey of reaction mechanisms and reactive intermediates in organic chemistry.

CHEM 666 Synthetic Organic Chemistry
Spring. 4 credits. Primarily for graduate students and upperclass undergraduates. Prerequisite: Chemistry 665 or permission of instructor.
Lecs, T R 8–9:30. D. Collum.
Modern techniques of synthesis; applications of organic reaction mechanisms to the problems encountered in rational multistep synthesis, with particular emphasis on modern developments in synthesis design.

CHEM 668 Chemical Aspects of Biological Processes
Fall. 4 credits. Prerequisite: Chemistry 360 or equivalent.
Lecs, T R 8:30–10; and occasionally M 8 p.m. T. P. Begley.
A representative selection of the most important classes of enzyme-catalyzed reactions will be examined from a mechanistic perspective. Topics discussed will include the chemical basis of enzymatic catalysis, techniques for the elucidation of enzyme mechanism, cofactor chemistry, the biosynthesis of penicillin, chlorophyll, methane, ethylene and amino acids. The application of chemical principles to understanding biological processes will be emphasized.

CHEM 671 Synthetic Polymer Chemistry (also Materials Science and Engineering 671 and Chemical Engineering 675)
Fall. 4 credits. Prerequisite: Chemistry 359–360 or equivalent or permission of instructor; recommended: Materials Science and Engineering 620.
Lecs, T R 8:30–10. J. M. J. Frechet.
Modern concepts in synthetic polymer chemistry. The application of organic synthesis to the development of new polymers and copolymers and the control of their architecture. Chain and step-growth polymerizations, reactions of polymers, block and graft copolymers. A broad spectrum of applications from recent literature will also be discussed.

[CHEM 672 Kinetics and Regulation of Enzyme Systems
Fall. 4 credits. Primarily for graduate students in Chemistry and Biochemistry. Prerequisite: Chemistry 390, Biological Sciences 331, or equivalents or permission of instructor. Not offered 1992–93.
Lecs, M W F 9:05. B. A. Baird.
Protein structure and dynamics; thermodynamics and kinetics of ligand binding; steady state and transient enzyme kinetics; enzyme catalysis and regulation; role of cell membrane receptors in regulating cellular activities.]

CHEM 677 Chemistry of Nucleic Acids
Spring. 4 credits. Primarily for graduate students. Prerequisites: Chemistry 358 or 360, and 390 or equivalents. S-U grades only.

Lecs, M W 10–11:10. D. A. Usher.
Properties, synthesis, reactions, and biochemical reactions of nucleic acids.

[CHEM 678 Thermodynamics
Spring. 4 credits. Primarily for graduate students. Prerequisite: Chemistry 288 or 390 or equivalents. Not offered 1992–93.
Lecs, T R 8:30–9:55. P. L. Houston.
Principles of equilibrium thermodynamics. Thermodynamic functions; First and Second Laws; gases and condensed phases; solutions; phase equilibrium; chemical equilibrium; surface thermodynamics; electrolytes; statistical thermodynamics and the Third Law.]

CHEM 681 Physical Chemistry III
Fall. 4 credits. Prerequisites: Chemistry 288 or 390; Mathematics 213 and Physics 208; or equivalents.
Lecs, M W F 10:10. B. A. Baird.
An introduction to the principles of quantum theory and statistical mechanics, atomic and molecular spectra, and elementary valence theory. At the level of *Quantum Chemistry*, by Levine.

CHEM 686 Physical Chemistry of Proteins
Spring. 4 credits. Primarily for graduate students. Prerequisite: Chemistry 288 or 390 or equivalents. S-U grades. Letter grades for undergraduates. Offered alternate years.
Lecs, M W F 8, and occasionally W 7:30 p.m.
Chemical constitution, molecular weight, and structural basis of proteins; thermodynamic, hydrodynamic, optical, spectroscopic, and electrical properties; protein and enzyme reactions; statistical mechanics of helix-coil transition in biopolymers; conformation of biopolymers; protein folding.

CHEM 700 Baker Lectures
Fall, on dates to be announced. No credit. Distinguished scientists who have made significant contributions to chemistry present lectures for periods varying from a few weeks to a full term. This year's lecturer: Dr. Charles Cantor, Univ. of California at Berkeley.

[CHEM 701–702 Introductory Graduate Seminar in Analytical, Inorganic, and Physical Chemistry
701, fall; 702, spring. No credit. Required of all first-year graduate students majoring in analytical, inorganic, physical, theoretical, and biophysical chemistry. Not offered 1992–93.
Hours to be arranged. Fall: P. L. Houston; spring: G. S. Ezra.]

[CHEM 716 Special Topics in Advanced Inorganic Chemistry
Fall. 3 credits. Not offered 1992–93.
Lecs, M W F 9:05.
Topics vary.]

[CHEM 745 Physical Polymer Science I (also Chemical Engineering 745)
Fall. 3 credits. Prerequisite: a graduate-level thermodynamics statistical course. Not offered 1992–93.
Lecs, to be arranged. C. Cohen.
Thermodynamic properties of dilute, semidilute, and concentrated solutions from both classical and scaling approaches. Characterization techniques of dilute solutions: osmometry, light scattering, viscometry, and sedimentation. Rubber elasticity; mechanical and thermodynamic properties of gels. Polymer melts: equations of state and glass transition phenomenon.]

[CHEM 762 Special Topics in Organic Chemistry
Spring. 4 credits. Not offered 1992–93.
Lecs, M W F 9:05.
Topics vary.]

CHEM 765 Physical Organic Chemistry I
Spring. 4 credits. Primarily for graduate students. Prerequisite: Chemistry 665 or permission of instructor.
Lecs, M W F 10:10. B. K. Carpenter.
Application of computational and experimental techniques to studies of organic reaction mechanisms and the properties of reactive intermediates.

[CHEM 766 Physical Organic Chemistry II
Spring. 3 credits. Primarily for graduate students. Prerequisite: Chemistry 765 or permission of instructor. Not offered 1992–93.
Quantitative aspects of organic chemistry.]

[CHEM 774 Chemistry of Natural Products
Fall. 3 credits. Primarily for graduate students. Prerequisites: Chemistry 665–666. Not offered 1992–93.
Lecs, T R 12:20.
Particular attention is devoted to methods of structure determination and synthesis as applied to selected terpenes, steroids, alkaloids, and antibiotics.]

CHEM 780 Principles of Chemical Kinetics
Fall. 4 credits. Prerequisite: Chemistry 681 or permission of instructor.
Lecs, M W F 9:05. D. B. Collum.
Principles and theories of chemical kinetics; special topics such as fast reactions in liquids, enzymatic reactions, energy transfer, and molecular beams.

[CHEM 782 Special Topics in Biophysical and Bioorganic Chemistry
Spring. 3 credits. Not offered 1992–93.
Lecs, T R 11:15.
Topics vary from year to year.]

[CHEM 789 X-ray Crystallography
Spring. 4 credits. Prerequisite: Chemistry 288 or 390 or permission of instructor. Offered alternate years. Not offered 1992–93.
M W F 10:10. J. Clardy.
A beginning course in the application of X-ray crystallography to structural chemistry. Topics include symmetry properties of crystals, diffraction of X-rays by crystals, interpretation of diffraction data, and refinement of structures. The chemical information available from a diffraction experiment is stressed, and theoretical aspects are illustrated by conducting an actual structure determination as a classroom exercise.]

CHEM 791 Spectroscopy
Fall. 4 credits. Prerequisite: Chemistry 793 or Physics 443 or equivalent.
Lecs, M W F 10:10–11. L. A. Philips.
The course will explore the interaction of light with matter. We will start with the quantum mechanical foundations of spectroscopy and follow with a detailed treatment of a variety of different spectroscopies including the study of rotation, rotation and vibration, and electronic spectra for simple molecules as well as polyatomics. As time and interest allow, we will cover special topics such as magnetic resonance, non-linear and molecular beam spectroscopies.

CHEM 792 Molecular Collision Theory
Spring. 4 credits.
Lecs, T R 10:10–11:25. G. S. Ezra.
The concepts and methods of scattering theory are described with particular emphasis on applications to problems of chemical interest. At the level of Child's *Molecular Collision Theory* and Taylor's *Scattering Theory*.

CHEM 793 Quantum Mechanics I
Fall. 4 credits. Prerequisites: Chemistry 681, coregistration in Mathematics 421 or equivalents or permission of instructor.
Lecs, M W F 11:15. G. S. Ezra.
Schrodinger's equation, wave packets, uncertainty principle, WKB theory, matrix mechanics, orbital and spin angular momentum, exclusion principle, perturbation theory, variational principle, Born-Oppenheimer approximation. At the level of Cohen-Tannoudji's *Quantum Mechanics*.

CHEM 794 Quantum Mechanics II
Spring. 4 credits. Prerequisites: Chemistry 793 or equivalent and coregistration in Physics 432 and Mathematics 422, or permission of instructor.
Lecs, M W F 9:05. A. C. Albrecht.
Electronic structure of atoms and molecules. Quantum chemical calculations. Group theory. Time-dependent phenomona in quantum mechanics and light/matter interaction. Spectroscopies. At the level of Weissbluth's *Atoms and Molecules* and Sakurai's *Modern Quantum Mechanics*.

[CHEM 796 Statistical Mechanics
Fall. 4 credits. Primarily for graduate students. Prerequisite: Chemistry 793 or equivalent. Not offered 1992–93.
Lecs, T R 8:30–9:55. J. H. Freed.
Microstates, ensembles, partition functions, and fluctuations. Quantum statistics. Thermodynamic properties of ideal gases and crystals. Chemical equilibrium. Dense gases. Structure of classical liquids. Phase transitions and critical phenomena. Introduction to nonequilibrium statistical mechanics: density matrix and response theory, transport processes, Brownian motion. At the level of *Statistical Mechanics*, by McQuarrie.]

CHEM 798 Special Topics in Physical Chemistry: Phase Transitions and Phase Equilibrium
Spring. 4 credits. Prerequisite: Chemistry 678 and 796 or the equivalent.
Lecs, T R 10:10–11:25. B. Widom.
Modern statistical mechanical and thermodynamic theories of phase transitions, phase coexistence, and interfacial structure.

CHINESE

See Modern Languages and Linguistics.

FALCON Program: 255–6457; C. Shih, 213 Morrill Hall, 255-4230; J. Wheatley, 416 Morrill Hall, 2559301.

CLASSICS

A. Nussbaum, chair ; L. S. Abel, F. M. Ahl (on leave 1992–93), K. Clinton (on leave fall 1992), J. E. Coleman, G. Davis (on leave fall 1992), J. G. DeFilippo, J. R. Ginsburg, I. Hohendahl, G. Holst-Warhaft, G. M. Kirkwood (emeritus), H. Kolias, P. I. Kuniholm, D. Mankin (director of undergraduate studies), G. M. Messing (emeritus), C. Minkowski (on leave fall 1992), P. T. Mitsis (graduate faculty representative), H. Pelliccia, P. Pucci, J. S. Rusten, D. R. Shanzer (on leave fall 1992), J. Whitehead

Nicole Loraux, Townsend Lecturer

Cornell University has long recognized the importance of studying the civilizations of ancient Greece and Rome. Particularly in an age of increasing specialization, study of the Classics is widely viewed as an excellent means of acquiring a liberal education; at Cornell, we are deeply interested in the continuing humanistic values contained in the literature of the ancient world and in gaining a fuller understanding of these important cultures and their imprint upon subsequent ages.

The Department of Classics at Cornell is one of the oldest and largest in the country. With eighteen faculty members, together with professors of related interests in the departments of History, Philosophy, Comparative Literature, History of Art, Modern Languages and Linguistics, and Near Eastern Studies and in the Archaeology, Medieval Studies, and Religious Studies programs, the range of instruction available is very large, including not only the traditional study of language, literature, and ancient history, but also newer developments in the field, such as comparative study of Mediterranean civilizations and modern literary theory.

Although Classics, like other areas of humanistic study, does not aim at providing specific preprofessional training, over the years Classics majors from Cornell have gone on to a wide variety of careers: in law, teaching, medicine, diplomacy, management, educational administration, government, and many others.

The department offers courses in Bronze Age and Classical archaeology and is active in field projects in Classical lands. It sponsors archaeological excavations at Halai in Greece and at the Etruscan site of La Piana in Italy, both of which serve as field training schools for Cornell undergraduate and graduate students. On campus there are also collections of ancient artifacts, reproductions of ancient sculpture, and one of the few laboratories in the world to concentrate on the tree-ring dating of ancient monuments from Greece, Cyprus, and Turkey. The archaeology courses may be used to satisfy some of the requirements for the Intercollegiate Program in Archaeology or for the major in Classical civilization. They require no knowledge of either Greek or Latin. Similarly, the department offers a variety of courses and seminars in English on such subjects as Greek mythology, Greek and Roman mystery religions, early Christianity, and Greek and Roman society, as well as ancient epic, tragedy, history, and philosophy. For those whose interest in things Greek and Roman extends no further than a desire to understand the English language a little better, the department offers one course in the Greek and Latin elements that make up a huge proportion of the vocabulary of Modern English, and another that deals more specifically with the Greek and Latin ingredients of bioscientific vocabulary. Programs in Greek and Latin at the elementary level are also offered, of course; and for the more ambitious there are courses involving reading, in the original, of Greek and Latin authors from Homer to St. Augustine and Bede and, periodically, the Latin works of Dante, Petrarch, and Milton. Sanskrit, the classical language of ancient India, is also offered, along with courses in translation on Indic religion, myth, and literature. The department makes every attempt to adapt its program to the needs of each student. If there is a Classical writer you would like to study, the department will do its best to help you do so whether you are a major in the department or not.

Majors

The Department of Classics offers majors in Classics, Greek, Latin, and Classical Civilization.

Classics

Those who major in Classics must complete 24 credits in advanced Greek or Latin (numbered 201 or above) and 15 credits in related subjects selected in consultation with the adviser.

Classical Civilization

Those who major in Classical Civilization must complete (a) qualification in Latin and Greek or proficiency in either; (b) 24 credits selected from the courses listed under Classical civilization, Classical archaeology, Latin, and Greek; and (c) 15 credits in related subjects selected in consultation with the adviser.

Greek

Those who major in Greek must complete 24 credits of advanced courses in Greek and 15 credits in related subjects (including Latin).

Latin

Requirements for the major in Latin parallel those of the major in Greek.

Honors

Candidates for the degree of Bachelor of Arts with honors in Classics, Greek, Latin, or Classical civilization must fulfill the requirements of the appropriate major study as given above and must also successfully complete the special honors courses 370, 471, and 472. Credit for honors courses may be included in the credits required for the major study. Students who wish to become candidates for honors, who have a cumulative average of B+ or better, and who have demonstrated superior performance in Classical courses (Greek, Latin, and Classical Civilization), submit an outline of their proposed honors work to the honors committee during the first month of their fifth semester. The chair will appoint a committee of three faculty members for each candidate, and the committee will be responsible for evaluating the candidate's proposal and subsequently supervising his or her work. At the completion of the honors thesis, which must demonstrate knowledge of the main bibliographical sources, give promise of scholarly talent, and show creativity, the committee will determine the level of honors to be awarded.

Study Abroad

Cornell participates in the Intercollegiate Center for Classical Studies in Rome, which offers courses in Latin, Greek, ancient history, art, archaeology, and Italian. Another opportunity for a semester's study abroad is available through Cornell Abroad in Greece at the Athens Centre. (Consult Cornell Abroad for details.) In addition, Cornell is a member institution of the American School of Classical Studies at Athens, whose Summer Program is open to graduate students and qualified undergraduates. The American Academy in Rome, of which Cornell is also a member institution, offers full-year and summer programs for qualified graduate students. For graduate students the Department of Classics offers a few travel grants each year from the Townsend Memorial Fund. Detailed information on these programs is available in the Department of Classics Office, 120 Goldwin Smith Hall.

Summer Support for Language Study

The Beatrice R. Kanders Memorial Scholarship (for the summer immediately following the freshman or sophomore year; preference given to dyslexic students) and a certain amount of aid made possible by gifts from the Constantinos C. Polychronis Foundation are normally available to students who want to enroll in Intensive Latin or Greek in the Cornell summer session. These six-week courses are designed to enable students to enter second-year Latin or Greek the following fall. Applications are due to the chair of the Department of Classics by March 26.

Placement in Latin, Ancient Greek, and Modern Greek

Placement of first-year students in Latin, ancient Greek, and modern Greek courses is determined by an examination given by the Department of Classics during orientation week or by arrangement with the director of undergraduate studies.

Freshman Writing Seminars

The department offers freshman writing seminars on a variety of topics. Consult John S. Knight Writing Seminar Program brochures and the Summer Session catalog for times, instructors, and descriptions.

Classical Civilization

CLASS 100 Word Power: Greek and Latin Elements in the English Language

Spring. 3 credits.

I. Hohendahl.

This course gives the student with no knowledge of the Classical languages an understanding of how the Greek and Latin elements that make up over half our English vocabulary operate in both literary and scientific English usage. Attention is paid to how words acquire their meaning and to enlarging each student's working knowledge of vocabulary and grammar.

CLASS 102 Word Power for the Biological Sciences
Summer. 3 credits. H. Roisman.
A study of the Greek and Latin word elements that combine to form most of the specialized terms in the biological sciences. The student who learns the meanings of those elements and the rules of word formation usually can recognize the basic meaning of any unfamiliar word in that field. The class also gives attention to misformations and words still in use that reflect outmoded scientific theories.

[CLASS 200 Classical Civilization #
Summer. 3 credits. Not offered summer 1993.
F. Ahl.]

CLASS 211 The Greek Experience #
Fall. 3 credits.
J. Coleman.
An introduction to the literature and thought of ancient Greece. Topics will include epic and lyric poetry, tragedy and comedy, and historical, political, philosophical, and scientific writings. Some attention will also be given to the daily life of ordinary citizens, supplemented by slides of ancient art and architecture.

CLASS 212 The Roman Experience #
Spring. 3 credits.
D. Mankin.
An introduction to the civilization of the Romans as expressed in their literature, religion, and social and political institutions.

CLASS 217–218 Initiation to Greco-Roman Culture and the Classical Tradition #
Limited to 18 students. These courses are intended especially for freshmen (a few exceptionally motivated sophomores or upperclass students may be accepted) and may be taken independently of one another. Apply in writing to the chair, Department of Classics, 120 Goldwin Smith Hall.
Knowledge of Greek or Latin is not necessary, since all texts are in translation. What is necessary is the willingness to participate in three one-hour seminars each week and also a supplementary one-hour (occasionally two-hour) session, during which the class will participate in workshops with specially invited guests.

CLASS 217 Initiation to Greek Culture #
Fall. 4 credits.
J. DeFilippo, P. Mitsis.
This course will examine the development in Greek thought from mythological to philosophical explanations of the world and man's place in it. Readings will include Homer, Aeschylus, Sophocles, Euripides, the pre-Socratics, Plato, and Aristotle.

CLASS 218 Initiation to the Classical Tradition: Voyages to Strange Worlds #
Spring. 4 credits.
C. Kaske, D. Shanzer.
Voyages to strange worlds: medieval, Renaissance, and modern reflections of the Greco-Roman tradition. We will begin by reading classical sources such as Homer's *Odyssey* and will continue with such texts as Lucian, Dante, More's *Utopia*, Kepler's *Dream*, and C. S. Lewis. We will explore heaven, hell, utopias, dystopias, and exotic lands.

[CLASS 223 The Comic Theater (also Comparative Literature 223 and Theatre Arts 223) #
3 credits. Students may not obtain credit for both this course and Classics 123. Not offered 1992–93; next offered 1993–94.
J. Rusten.
The origins of comic drama in ancient Greece and Rome, and its subsequent incarnations especially in the Italian renaissance (*Commedia erudita* and *Commedia dell'arte*), Elizabethan England, seventeenth-century France, the English Restoration, and Hollywood in the thirties and forties. Chief topics will be: the growth of the comic theatrical tradition and conventions; techniques and themes of comic plots (trickster, parody, farce, caricature); and the role of comedy in society. All readings in English.]

CLASS 235 Modern Greek Poetry and Politics (also Comparative Literature 235)
Fall. 3 credits.
G. Holst-Warhaft.
The history of modern Greece has been marked by a series of political crises that have resulted in deep divisions in society. Greek poetry has reflected these crises and divisions, and in this course the poetry of nineteenth- and twentieth-century Greece will be interpreted in its historical and political context. The course will concentrate on four periods in which there has been a particularly strong interaction. The continuity of ancient Greek myths in modern Greek poetry will also be explored.

CLASS 236 Greek Mythology (also Comparative Literature 236) #
Fall or summer. 3 credits.
D. Mankin.
A survey of the Greek myths, with emphasis on the content and significance of the myths in Mediterranean society, including the place of myth in Greek life and consciousness; the factors and influences involved in the creation of myths; and the use of myths for our understanding of Greek literature, religion, and moral and political concepts.

[CLASS 237 Greek Religion and Mystery Cults (also Religious Studies 237) #
3 credits. Not offered 1992–93.
K. Clinton.]

[CLASS 238 The Ancient Epic #
3 credits. Not offered 1992–93.]

[CLASS 245 Greek and Roman Historians #
3 credits. Not offered 1992–93.
J. Ginsburg.]

[CLASS 300 Greek and Roman Drama (also Comparative Literature 300) #
4 credits. Not offered 1992–93.]

CLASS 333 Greek and Roman Mystery Cults and Early Christianity (also Religious Studies 333) #
Spring. 4 credits. A previous course in Classics (civilization or language) or Religious Studies 101 is recommended.
K. Clinton.
A study of the controversial question of religious continuity between paganism and early Christianity. After a brief survey of Classical mystery cults and Hellenistic religion, the course will focus on such Hellenistic cults as the mystery cults of Isis, Bacchus, and Attis and the Great Mother and on the distinctive features that contributed to their success. Discussion of Christian liturgy and beliefs both in the East and the West to determine what Christianity owed to its pagan predecessors and to isolate the factors that contributed to its triumph over the "rival" pagan cults of late antiquity.

[CLASS 339 Ancient Wit: An Introduction to the Theory and Form of Comic and Satiric Writing in Greece and Rome (also Comparative Literature 339) #
4 credits. Not offered 1992–93; next offered 1993–94.
F. Ahl.
The aim is not only to provide an introduction to the comedy, satire, and other humorous writing in Greek and Roman literature, but to discuss the ancient works in light of modern theories of comedy and laughter. Discussion of the nature of laughter itself in light of both ancient and modern scholarship on the subject, from Plato's *Philebus* to Freud's *Wit and Its Relation to the Unconscious* and Koestler's *The Act of Creation*. Examination of select works and passages of Homer, Euripides, Aristophanes, Hierocles, Lucian, Plautus, Nonnus, Horace, Martial, Juvenal, and Petronius.]

[CLASS 340 Democracy and Justice in Ancient Greece (also Government 360) #
4 credits. Prerequisite: one of the following: survey of Greek history, a course in Greek civilization, a course in political theory or comparative politics, or permission of instructor. Not offered 1992–93; next offered 1994–95.
L. Abel.
The Greek word *politeia* means "constitution," but not a single written document. It means the form of political life within a state. This course will survey briefly the variety of forms of political life in ancient Greece from the time of Homer to the Classical fourth-century Athenian democracy. The majority of time will be devoted to the history, functioning, and assessment of the Athenian democracy and Athenian law. The second major topic will be the constitution of Sparta and its role as the alternative to democracy. As each constitution is studied, the role of women and ideas of justice within the state will be considered. Required readings will be in translation.]

[CLASS 363 Representations of Women in Ancient Greece and Rome (also Women's Studies 363) #
4 credits. Not offered 1992–93; next offered 1993–94.
L. S. Abel, J. Ginsburg.
Classical authors created and left behind powerful images of women and of what women ought and ought not to be. These writers also provide fleeting insights into the real lives of women in antiquity. In this course, we will examine the ancient evidence in order to trace the origin of some Western attitudes about women and to analyze the assumptions that underlie the representations of women in ancient Greece and Rome. How are these images constructed and how do they work? How can we use the ancient evidence to assess the real lives and social roles of women in antiquity?]

[CLASS 382 Greeks, Romans, and Victorians (also Society for the Humanities 382) #
4 credits. Not offered 1992–93; next offered 1993–94.
F. Ahl.
Modern popular and scholarly views of Greek and Latin literature were shaped in the Victorian years of the nineteenth century, between the years of Republican and Marxist revolution. This course explores some of the ways in which nineteenth-century social and intellectual upheavals, and changes in scholarly techniques and approaches, may have affected how English and Irish writers presented Greco-Roman antiquity and, especially, how they began to discard an idealized past based on a Roman model for one based on a Greek model. The focus will be on poets and dramatists (and a few artists and novelists) rather than on philosophers and scientists. The varied influences of Vergil and Homer, Seneca and Sophocles, Plautus and Aristophanes, Horace, and Greek lyric poetry will be discussed in selected works of writers such as Thomas More, Shelley, Byron, Swinburne, Arnold, Tennyson, W. S. Gilbert, Oscar Wilde, Samuel Butler, and others, including important artists such as Aubrey Beardsley.]

[CLASS 390 Comparative Sanskrit Myth and Epic (also Asian Studies 390) @#
4 credits. Not offered 1992–93; next offered 1993–94.
C. Minkowski.
Readings in translation from the two Sanskrit epics, the *Mahabharata* and the *Ramayana*, and from the main cycles of the *Puranas*, the Sanskrit mythological literature. Special attention will be given to parallels and comparisons with Greek myth and epic, especially Homer and Hesiod. Classics 236 or 238 would be useful as background, but not presupposed.]

[CLASS 391 Classical Indian Narrative (also Asian Studies 391) @#
4 credits. Not offered 1992–93; next offered 1994–95.
T R 1:25–2:40. C. Minkowski.
Readings in translation from the principal story literature of ancient India. Sources will include the Vedas, the Buddhist Jatakas, the Sanskrit epics, the *Kathasaritsagara*, the *Pancatantra*, and related collections. Attention will be given to comparisons with early Greek narrative, and to the diffusion of Indian narrative through the world's literatures.]

[CLASS 395 Classical Indian Philosophical Systems (also Asian Studies 395 and Religious Studies 395) @#
4 credits. Some background in philosophy or in classical Indian culture is desirable, but not required. Not offered 1992–93; next offered 1994–95.
C. Minkowski.
A survey of the traditions of philosophical inquiry in ancient India, especially Nyaya, Sankhya, Mimamsa, and Vedanta. Topics will include: the origins in and relationship to the Vedas; the formation of distinct positions on such subjects as perception, language, identity, karma, and liberation; the dialogue with Buddhists, Jains, skeptics, materialists, cynics; new theistic models, particularly among the Saiva philosophers in Kashmir.]

CLASS 459 The Language of Myth
Spring. 4 credits.
P. Pucci.
From structuralism to psychoanalysis to deconstruction, we will analyze the language of myth, its bearing on molding and shaping Archaic Greek thought and culture. We will also consider the vitality of myth in today's world.

CLASS 465–466 Independent Study in Classical Civilization, Undergraduate Level
465, fall; 466, spring. Up to 4 credits.
Hours to be arranged. Staff.

CLASS 480 Roman Society and Politics under the Julio-Claudians #
Spring. 4 credits. Prerequisite: Classics 212, History 268, or permission of instructor.
J. Ginsburg.
An undergraduate seminar examining several of the important social and political changes in Roman society under Augustus and his successors, the Julio-Claudians. Topics to be investigated include Augustus's consolidation of power through political and social revolution, the Augustan attempt to regulate family life and social relations by legislation, the relation of the emperor Tiberius with the members of the old ruling class, the growth of the imperial bureaucracy and the new opportunities for social mobility, the political opposition to Claudius and Nero, Nero's cultural and provincial policy, and the manipulation of the imperial cult. All readings will be in English.

[CLASS 668 Medieval Education and the Classical Tradition
4 credits. Not offered 1992–93.
W. Wetherbee.]

[CLASS 681 Patristic Seminar: Graduate
4 credits. Not offered 1992–93.]

CLASS 711–712 Independent Study for Graduate Students in Classical Civilization
711, fall; 712, spring. Up to 4 credits.
Hours to be arranged. Staff.

Greek

CLASS 101 Greek for Beginners
Fall. 4 credits.
A. Nussbaum.
Introduction to Attic Greek. Designed to enable the student to read the ancient authors as soon as possible.

CLASS 103 Attic Greek
Spring. 4 credits. Prerequisite: 101 or equivalent.
H. Pelliccia.
A continuation of Classics 101.

CLASS 104 Intensive Greek
Summer. 6 credits.
An intensive introduction to the fundamentals of ancient Greek grammar. Prepares students in one term for 200-level Greek.

CLASS 111–112 Modern Greek
111, fall; 112, spring. 3 credits each term.
H. Kolias.

CLASS 201 Attic Authors #
Fall. 3 credits. Prerequisite: Classics 103 or 104 or equivalent.
J. Rusten.
Selected readings from Greek prose writers.

[CLASS 202 The New Testament (also Near Eastern Studies 220 and Religious Studies 202) #
Spring. 3 credits. Prerequisite: at least one year of ancient Greek (Classics 101–103) or permission of instructor. Not offered 1992–93; next offered 1993–94.
J. Rusten.
Selections in Greek from all four gospels and the letters of Paul, with special attention to Luke, Acts, and Corinthians I–II.]

CLASS 206 Herodotus #
Spring. 3 credits. Prerequisite: Classics 103 or 104 or equivalent.
K. Clinton.
Selected readings from Herodotus' *Histories*.

[CLASS 209 Greek Composition
Fall. 3 credits. Prerequisite: One term of 200-level Greek or equivalent. Not offered 1992–93; next offered 1993–94.]

[CLASS 210 Greek Composition
Spring. 3 credits. Prerequisite: Classics 209 or equivalent. Not offered 1992–93.]

CLASS 213 Intermediate Modern Greek
Fall. 3 credits. Prerequisite: Classics 112 or placement by departmental examination.
H. Kolias.
This course, designed for students who have completed introductory modern Greek or have a reading knowledge of the language, will give attention to developing facility in conversational and written expression, usually in connection with assigned readings reflecting Greek history and culture.

CLASS 214 Readings in Modern Greek Literature
Spring. 3 credits. Prerequisite: Classics 213 or permission of instructor.
H. Kolias.
A study of modern Greek language, history, and culture as manifested in the works of individual poets, dramatists, and prose writers.

[CLASS 301 Greek Historians #
4 credits. Prerequisite: one term of 200-level Greek. Not offered 1992–93.]

[CLASS 302 Greek Tragedy #
4 credits. Prerequisite: one term of 200-level Greek or equivalent. Not offered 1992–93.]

[CLASS 303 Readings in Greek Rhetoric #
4 credits. Prerequisite: one term of 200-level Greek or equivalent. Not offered 1992–93.]

[CLASS 305 Attic Comedy #
4 credits. Prerequisite: one term of 200-level Greek or equivalent. Not offered 1992–93.]

[CLASS 306 Greek Lyric Poetry #
4 credits. Prerequisite: one term of 200-level Greek or equivalent. Not offered 1992–93.]

[CLASS 307 Plato #
4 credits. Prerequisite: one term of 200-level Greek or equivalent. Not offered 1992–93.]

CLASS 310 Greek Undergraduate Seminar: Hesiod #
Spring. 4 credits. Prerequisite: two 200-level courses in Greek or permission of instructor.
P. Pucci.

CLASS 311 Greek Philosophical Texts (also Philosophy 411) #
Fall or spring. Up to 4 credits. Prerequisites: knowledge of Greek and permission of instructor.
Hours to be arranged. T. H. Irwin.

Reading of Greek philosophical texts in the original.

CLASS 313 Greek Epic #
Fall. 4 credits. Prerequisite: Classics 206 or equivalent.
P. Pucci.
Readings from the *Iliad*. Emphasis upon the nature of Homeric language and the literary interpretation of the poem.

CLASS 401–402 Independent Study in Greek, Undergraduate Level
401, fall; 402, spring. Up to 4 credits.
Hours to be arranged. Staff.

CLASS 417 Advanced Readings in Greek Literature: Euripides #
Fall. 4 credits.
P. Pucci.

CLASS 418 Advanced Readings in Greek: Greek Lyric Poetry #
Spring. 4 credits.
H. Pelliccia.

CLASS 419 Advanced Greek Composition
Fall. 3 credits. Prerequisite: Classics 209–210 or equivalent.
H. Pelliccia.

[CLASS 442 Greek Philosophy #
Fall or spring. 4 credits. Not offered 1992–93.]

CLASS 671 Graduate Seminar in Greek: Old Comedy
Fall. 4 credits.
J. Rusten.

CLASS 672 Graduate Seminar in Greek: Aeschylus and Sophocles
Spring. 4 credits.
N. Loraux.

CLASS 701–702 Independent Study for Graduate Students in Greek
701, fall; 702, spring. Up to 4 credits.
Hours to be arranged. Staff.

Latin

CLASS 105 Latin for Beginners
Fall. 4 credits.
Staff.
An introductory course in the essentials of Latin, designed for rapid progress toward reading the principal Latin writers.

CLASS 106 Elementary Latin
Spring. 4 credits.
Staff.
A continuation of Classics 105, using readings from various authors.

CLASS 107 Intensive Latin
Spring or summer. 6 credits.
Spring: A. Nussbaum.
Prepares students in one term for 200-level Latin.

CLASS 205 Intermediate Latin #
Fall or summer. Prerequisite: Classics 106, 107, or placement by departmental examination.
Fall: J. Ginsburg; J. DeFilippo.
Readings in Latin prose.

CLASS 207 Catullus #
Spring. 3 credits. Prerequisite: Classics 106, 107, or one term of 200-level Latin.
D. Mankin.

[CLASS 208 Roman Drama #
3 credits. Prerequisite: Classics 106, 107, or one term of 200-level Latin. Not offered 1992–93.]

CLASS 216 Vergil #
Spring. 3 credits. Prerequisite: Classics 106, 107, or one term of 200-level Latin.
J. Ginsburg.

CLASS 241 Latin Composition
Fall. 3 credits. Prerequisite: Classics 106, 107, or equivalent.
H. Pelliccia.

[CLASS 242 Latin Composition
Spring. 3 credits. Prerequisite: Classics 241 or equivalent. Not offered 1992–93.]

CLASS 312 Latin Undergraduate Seminar: The Archaeology of Ovid's *Fasti* #
Fall. 4 credits. Prerequisite: two terms of 200-level Latin or permission of instructor.
J. Whitehead.
Ovid's poem, based on the Roman calendar year, offers a wealth of information and anecdotes about the ancient cults of the city. The poem is particularly interesting in the way it illuminates the tension between the strongly conservative nature of Roman religion and the considerable changes in Roman society and politics. Students will read selections from the *Fasti* in Latin. Secondary source reading and discussion will center on the archaeological aspects.

[CLASS 314 The Augustan Age #
4 credits. Prerequisite: two terms of 200-level Latin or permission of instructor. Not offered 1992–93.]

[CLASS 315 Roman Satire #
4 credits. Prerequisite: two terms of 200-level Latin or permission of instructor. Not offered 1992–93.]

[CLASS 316 Roman Philosophical Writers #
4 credits. Prerequisite: two terms of 200-level Latin. Not offered 1992–93.]

[CLASS 317 Roman Historiography #
4 credits. Prerequisite: one term of 300-level Latin or permission of instructor. Not offered 1992–93.
J. Ginsburg.]

[CLASS 318 Roman Elegy: Tibullus, Propertius, Ovid #
4 credits. Prerequisite: two terms of 200-level Latin. Not offered 1992–93.]

CLASS 338 Latin Undergraduate Seminar: The *Golden Ass* of Apuleius #
Spring. 4 credits. Prerequisite: two terms of 200-level Latin or permission of instructor.
J. DeFilippo.
Selections from various parts of the *Golden Ass* but with a special focus on the literary and philosophical significance of the story of Cupid and Psyche as told there. In addition to reading the Cupid and Psyche story in Latin, there will be readings in English of works by Apuleius, Plato, Plutarch, and the Greek novelists.

[CLASS 366 Late Latin: Epic after Vergil #
4 credits. Not offered 1992–93.
F. Ahl.]

[CLASS 368 Medieval Latin Literature #
4 credits. Prerequisite: two terms of 200-level Latin or permission of instructor. Not offered 1992–93.]

CLASS 411 Advanced Readings in Latin Literature: Cicero #
Fall. 4 credits.
P. Mitsis.

CLASS 412 Advanced Readings in Latin Literature: Martyrs, Wives, Virgins, Widows: Christian Women of the Later Roman Empire (also Religious Studies 412) #
Spring. 4 credits.
D. Shanzer.
This course will read a variety of texts reflecting the lives, writings, and roles of various types and conditions of Christian women in the third through fifth centuries A.D. Most if not all of the reading will be done in Latin. We will study the Late Roman Christian woman from various points of view, using the resources of social history, literary criticism, philology, and theology.

[CLASS 441 Advanced Latin Composition
Fall. 3 credits. For undergraduates who have completed Latin 241–242 and for graduate students. Not offered 1992–93; next offered 1993–94.]

CLASS 451–452 Independent Study in Latin, Undergraduate Level
451, fall; 452, spring. Up to 4 credits.
Hours to be arranged. Staff.

[CLASS 468 Augustine's *Confessions* (also Religious Studies 468) #
4 credits. Prerequisite: two terms of 200-level Latin or permission of instructor. Not offered 1992–93.
D. R. Shanzer.]

[CLASS 603–604 Topics in Late Antique and Medieval Latin Literature
4 credits each term. Not offered 1992–93.
D. R. Shanzer.

CLASS 679 Graduate Seminar in Latin: Roman Historiography
Fall. 4 credits.
J. Ginsburg.

CLASS 680 Graduate Seminar in Latin: Ovid
Spring. 4 credits.
G. Davis.

CLASS 751–752 Independent Study for Graduate Students in Latin
751, fall; 752, spring. Up to 4 credits.
Hours to be arranged. Staff.

Classical Art and Archaeology

[CLASS 219 Mediterranean Archaeology (also Near Eastern Studies 267) #
3 credits. Not offered 1992–93; next offered 1993–94.
J. Coleman.
An examination of the archaeological bases of ancient Mediterranean civilization with special focus on contacts and interrelationships in the Bronze Age (ca. 3500-1100 B.C.). Topics include the Neolithic of Anatolia, Greece, and the Near East; the rise of civilization in Egypt; the Bronze Age states of Syro-Palestine (Ebla, Ugarit, Byblos, etc.); Cyprus, copper, and the Alasia question; the Hittites and Bronze Age Anatolia; the early Bronze Age in Greece; Minoans, Mycenaeans, and their eastern and

western contacts; the Bronze Age in the western Mediterranean; and ancient ships and trade in the late Bronze Age.]

CLASS 220 Introduction to Classical Archaeology (also History of Art 220) #
Spring. 3 credits.
J. Whitehead.
The archaeology of the ancient Greeks and Romans as seen from a critical perspective. Major developments in Classical archaeology will be traced from treasure hunting to modern scientific research. Examples illustrating various approaches will be chosen: the sculpture, vase painting, and architecture of the ancient Greeks from the Geometric period through the Hellenistic, and the art of the Romans from the early republic to the late empire.

CLASS 221 Minoan-Mycenaean Art and Archaeology (also Archaeology 221 and History of Art 221) #
Fall. 3 credits. Students may not obtain credit for both this course and Classics 319.
J. Coleman.
The birth of civilization in Greece and the Aegean islands during the Bronze Age. The main focus is on the rise and fall of Minoan Crete and Mycenaean Greece, with consideration given to the nature and significance of Aegean interactions with Egypt, the Near East, and Anatolia.

[CLASS 232 Archaeology in Action I (also Archaeology 232 and History of Art 224) #
Fall. 3 credits. Prerequisite: permission of instructor. Not offered fall 1992.
P. I. Kuniholm.]

[CLASS 233 Archaeology in Action II (also Archaeology 233 and History of Art 225) #
Spring. 3 credits. Prerequisite: permission of instructor. Not offered spring 1993.
P. I. Kuniholm.]

[CLASS 250 Etruscan Art and Archaeology (also Archaeology 250 and History of Art 223) #
3 credits. Not offered 1992–93.]

CLASS 309 Dendrochronology of the Aegean (also Archaeology 308 and History of Art 309)
Fall or spring. 4 credits. Limited to 10 students. Prerequisite: permission of instructor.
P. I. Kuniholm.
Participation in a research project of dating modern and ancient tree-ring samples from the Aegean and Mediterranean. Supervised reading and laboratory work. A possibility exists for summer fieldwork in Greece or Turkey.

[CLASS 319 Minoan-Mycenaean Archaeology #
4 credits. Prerequisite: participants are expected already to have completed some course work in Mediterranean or Classical archaeology (e.g., Classics 219/Near Eastern Studies 267, Classics/History of Art 220). Students may not obtain credit for both this course and Archaeology/Classics/History of Art 221. Not offered 1992–93.
J. Coleman.]

[CLASS 320 The Archaeology of Classical Greece (also History of Art 320) #
Fall. 4 credits. Prerequisite: Classics 220 or History of Art 220 or permission of instructor. Not offered 1992–93.
A. Ramage.]

[CLASS 321 Archaeology of Cyprus (also History of Art 321) #
4 credits. Prerequisite: Classics 220 or permission of instructor. Not offered 1992–93.]

[CLASS 322 Greeks and Their Neighbors (also History of Art 328) #
4 credits. Prerequisite: Classics 220 or 221, or permission of instructor. Not offered 1992–93.
J. Coleman.]

[CLASS 323 Painting in the Greek and Roman World (also History of Art 323) #
4 credits. Not offered 1992–93.
A. Ramage.]

[CLASS 325 Greek Vase Painting (also History of Art 325) #
4 credits. Prerequisite: previous enrollment in a History of Art or Classics course or permission of instructor. Not offered 1992–93.
A. Ramage.]

[CLASS 326 Greek Cities and Towns (also History of Art 326) #
4 credits. Prerequisite: Classics 220 or History of Art 220. Not offered 1992–93.
J. Coleman.]

[CLASS 327 Greek and Roman Coins (also History of Art 327) #
4 credits. Prerequisite: History of Art 220 or Classics 220 or permission of instructor. Not offered 1992–93.
A. Ramage.]

CLASS 329 Greek Sculpture (also History of Art 329) #
Spring. 4 credits.
J. Coleman.
This course will examine ancient Greek sculpture, both three-dimensional and two-dimensional, from the Archaic period to the Hellenistic. We will study various aspects of the works: technological advances in handling materials, the changing ideology of the sculptors, regionality of styles, and taste of individual patrons. Sculptures of marble and bronze will be considered, and comparisons with other ancient civilizations that influenced the Greek will be undertaken.

[CLASS 350 Arts of the Roman Empire (also History of Art 322) #
4 credits. Prerequisite: Classics 220 or permission of instructor. Not offered 1992–93.]

[CLASS 356 Practical Archaeology (also Archaeology 356)
4 credits. Prerequisite: one course in archaeology. Not offered 1992–93; next offered 1993–94.
J. Coleman.
The fundamentals of archaeological fieldwork, including techniques of excavation and recording. Hands-on experience with cataloging of ancient objects in the Herbert F. Johnson Museum of Art and the collection of the Department of Classics. No previous fieldwork required. Especially recommended for those planning to participate in summer field programs such as the Cornell project at Halai and East Lokris in Greece.]

CLASS 360 Field Archaeology in Greece (also Archaeology 360) #
Summer. 6 credits.
J. Coleman.
A six-week archaeological field training program in conjunction with the Cornell Halai and East Lokris Project. For information and application forms, contact Professor John E. Coleman, Department of Classics, 120 Goldwin Smith Hall.

CLASS 361 Summer Program in Etruscan Archaeology at La Piana near Siena, Italy (also Archaeology 361)
Summer. Non-credit, or 3 or 6 credits.
J. Whitehead.
A five-week program that offers a field school in excavation techniques, handling of artifacts, and archaeological recording. For information and application forms, contact Professor Jane Whitehead, Department of Classics, 120 Goldwin Smith Hall.

[CLASS 423 Ceramics (also Archaeology 423 and History of Art 423)
4 credits. Prerequisite: Classics 220 or History of Art 220 or permission of instructor. Not offered 1992–93.
A. Ramage.]

[CLASS 432 Sardis and the Cities of Asia Minor (also Archaeology 432 and History of Art 432) @#
4 credits. Prerequisite: permission of instructor. Not offered 1992–93.
A. Ramage.]

[CLASS 434 The Rise of Classical Greece (also Archaeology 434 and History of Art 434) #
4 credits. Prerequisite: Classics 220 or 221, History of Art 220 or 221, or permission of instructor. Not offered 1992–93.
P. I. Kuniholm.]

[CLASS 435 Seminar on Roman Art and Archaeology (also History of Art 427) #
4 credits. Prerequisite: permission of instructor. Not offered 1992–93.
A. Ramage.]

CLASS 475–476 Independent Study in Classical Archaeology, Undergraduate Level
475, fall; 476, spring. Up to 4 credits.
Hours to be arranged. Staff.

[CLASS 629 Graduate Seminar in Bronze Age Archaeology
4 credits. Not offered 1992–93.
J. Coleman.]

[CLASS 630 Graduate Seminar in Classical Greek Archaeology
4 credits. Not offered 1992–93.
J. Coleman.]

CLASS 721–722 Independent Study for Graduate Students in Classical Archaeology
721, fall; 722, spring. Up to 4 credits.
Hours to be arranged. Staff.

Greek and Latin Linguistics

CLASS 405 Vulgar Latin #
Fall. 4 credits.
G. Messing.
Selected texts such as the *Peregrinatio ad loca sancta* will be used to chart the changes in Latin that contributed to the development of the Romance languages.

[CLASS 421 Greek Comparative Grammar (also Linguistics 609) #
4 credits. Prerequisite: thorough familiarity with the morphology of classical Greek. Not offered 1992–93; next offered 1993–94.
A. Nussbaum.
The prehistory and evolution of the sounds and forms of ancient Greek as reconstructed by comparison with the other Indo-European languages.]

[CLASS 422 Latin Comparative Grammar (also Linguistics 610) #
Fall or spring. 4 credits. Prerequisite: thorough familiarity with the morphology of classical Latin. Not offered 1992–93; next offered 1993–94.
A. Nussbaum.
The prehistory and evolution of the sounds and forms of Classical Latin as reconstructed by comparison with the other Indo-European languages.]

[CLASS 424 Italic Dialects (also Linguistics 612) #
4 credits. Not offered 1992–93.
A. Nussbaum.]

CLASS 425 Greek Dialects (also Linguistics 611) #
Fall. 4 credits.
A. Nussbaum.
A survey of the dialects of ancient Greek through the reading and analysis of representative epigraphical and literary texts.

CLASS 426 Archaic Latin (also Linguistics 614) #
Spring. 4 credits. Prerequisite: reading knowledge of Latin.
A. Nussbaum.
Reading of epigraphic and literary preclassical texts with special attention to archaic and dialectal features. The position of Latin among the Indo-European languages of ancient Italy, the rudiments of Latin historical grammar, and aspects of the development of the literary language.

[CLASS 427 Homeric Philology (also Linguistics 613) #
4 credits. Prerequisite: ability to read Homeric Greek. Not offered 1992–93.
A. Nussbaum.]

[CLASS 429 Mycenaean Greek (also Linguistics 615) #
4 credits. Prerequisite: thorough familiarity with the morphology of Classical Greek. Not offered 1992–93.
A. Nussbaum.]

Sanskrit

[CLASS 131–132 Elementary Sanskrit (also Sanskrit 131–132)
131, fall; 132, spring. 4 credits each term. Not offered 1992–93; next offered 1993–94.
C. Minkowski.
An introduction to the essentials of Sanskrit grammar. Designed to enable the student to read classical and epic Sanskrit as quickly as possible.]

CLASS 251–252 Intermediate Sanskrit (also Sanskrit 251–252) @#
251, fall; 252, spring. 3 credits each term. Prerequisite: Classics 132 or equivalent.
Fall: J. Jasanoff; spring: C. Minkowski.
Readings from the literature of Classical Sanskrit. Fall: selections from the two Sanskrit epics, the *Mahabharata* and the *Ramayana*. Spring: more selections from the epics, and from either Sanskrit story literature or from Sanskrit dramas.

CLASS 403–404 Independent Study in Sanskrit, Undergraduate Level
403, fall; 404, spring. Up to 4 credits.
Hours to be arranged. C. Minkowski.

CLASS 703–704 Independent Study for Graduate Students in Sanskrit
703, fall; 704, spring. Up to 4 credits.
Hours to be arranged. C. Minkowski.
Also see Classics 390, 391, and 395 (Classical Civilization listings).

Honors Courses

CLASS 370 Honors Course
Spring. 4 credits. To be taken in the junior year.
A program of reading and conferences centered on an author or topic chosen in accordance with the special interests of the student and instructor.

CLASS 471 Honors Course
Fall. 4 credits. To be taken in the senior year.
A continuation of Classics 370, with change of author or topic.

CLASS 472 Honors Course: Senior Essay
Spring. 4 credits. For students who have successfully completed Classics 471. Topics must be approved by the student's honors committee at the end of the first term of the senior year.

Related Courses in Other Departments and Programs

See listings under:

Archaeology

Comparative Literature

English

History

History of Art

Medieval Studies

Modern Languages and Linguistics

Near Eastern Studies

Philosophy

Religious Studies

Society for the Humanities

Women's Studies

COMPARATIVE LITERATURE

G. Davis, (spring) chair (141 Goldwin Smith Hall, 255-5798, 5-4995); W. Cohen, acting chair (fall) (141 Goldwin Smith Hall, 255-5798); W. Kennedy, director of undergraduate studies (163 Goldwin Smith Hall, 255-6795); C. Arroyo, A. Caputi (Emeritus), C. Carmichael, D. Castillo, J. Culler, B. deBary, G. Gibian, D. Grossvogel, P. Hohendahl, W. Holdheim (Emeritus), J. Monroe, J. Porte, E. Rosenberg, L. Waugh, W. Wetherbee

Also cooperating: D. Bathrick, M. Bernal, J. Bishop, R. Brann, P. Carden, S. Gilman, M. Hays, G. Holst-Warhaft, D. LaCapra, D. Mankin, T. Murray, J. Najemy, J. Ngate, J. Piedra, N. Saccamano, S. Senderovich, G. Shapiro

The Department of Comparative Literature provides a broad range of courses in European as well as non-European literatures. Courses variously stress significant authors, themes, problems, styles, genres, historical periods, and theoretical perspectives. The departmental offerings reflect current interdisciplinary approaches to literary study, hermeneutics, rhetorical analysis, semiotics, deconstruction, Marxism, reception aesthetics, feminism, formalism, and psychoanalysis.

The Major

The major enables students to develop an integrated knowledge of Western literature, to strengthen their reading and writing abilities, and to prepare for careers demanding analytical, interpretive, and evaluative skills. Prospective majors should consult with the director of undergraduate studies. After declaring a major, a student chooses an adviser from the department's faculty. The requirements for the major are designed to allow each student to follow a course of study that combines intellectual rigor with the pursuit of personal interests. The specific contours of such a program are worked out in consultation with the student's adviser.

Requirements for the Major

1) Five courses in Comparative Literature at the 200 level and above, including the core course listed below. A student may include up to two literature courses from other departments.
2) One core course in Comparative Literature (for 1992–93 the core courses are Comparative Literature 372 [fall] and Comparative Literature 365 [spring]), to be taken by all majors either in the spring term of their junior year or the fall term of their senior year. Students may enroll in both core courses.
3) Five courses in literature or other areas of the humanities at the 200 or higher level, to be taken in one or more foreign literature departments. Texts must be read in the original language. A student may offer one language course (conversation, composition, etc.).
4) A senior essay (Comparative Literature 493) of roughly fifty pages, to be written during the senior year under the direction of the student's adviser.

The department also encourages:

1) a program that includes broad historical coverage (e.g., Comparative Literature 201–202: Great Books, Comparative Literature 210: Ancients and Moderns); intensive study of a single genre, (e.g., Comparative Literature 320: Introduction to Caribbean Poetry, Comparative Literature 363–364: The European Novel); Comparative Literature 365: Contemporary Fiction; analysis of problems in literary theory (e.g., Comparative Literature 302: Literature and Theory, Comparative Literature 381: Marxist Cultural Theory, and Comparative Literature 402: Theories of Rhetoric)
2) a second foreign language, especially for students interested in graduate work in literature.

Honors

A student who completes the requirements for the major is eligible for the degree of Bachelor of Arts with honors in comparative literature. The department bases its decision on the student's achieving grades of at least B+ in the senior essay and in course work for the major, and on overall academic performance at Cornell.

Freshman Writing Seminars

Most 100-level courses may be used toward satisfying the freshman writing seminar requirements. See "John S. Knight Writing Program" for a full description of the freshman writing seminar program.

Courses

[COM L 150 Introduction to Cultural Studies (also Society for the Humanities 150)
4 credits. Does not satisfy the freshman writing seminar requirement, but will satisfy the distribution requirement. Not offered 1992–93.
T R 10:10–11:25. W. Cohen.]

COM L 201–202 Great Books (201 by petition for breadth requirement)
201, fall; 202, spring. 4 credits. Comparative Literature 201 and 202 may be taken independently of each other.
Fall: M W F 10:10–11. Staff. Spring: M W F 10:10–11. Staff.
A reading each semester of seminal texts that form an essential part of the student's intellectual equipment. By analyzing, interpreting, and evaluating, students will develop critical reading abilities.

201: selections from Homer, Aeschylus, Plato, Virgil, Dante, Boccaccio, and others.

202: selections from Moliere, Goethe, Blake, Flaubert, Baudelaire, Kafka, Woolf, Conrad, Eliot, García-Márquez, and others.

[COM L 210 Ancients and Moderns
4 credits. Not offered 1992–93.
W. J. Kennedy.]

[COM L 223 The Comic Theater (also Classics 223 and Theatre Arts 223) #
3 credits. Students may not obtain credit for both this course and Classics 123.
J. Rusten. Not offered 1992–93.]

COM L 234 Muslims, Christians and Jews in Islamic Spain: Literature and Society (also Near Eastern Studies 234, Spanish Literature 240, and Religious Studies 234) @#
Spring. 3 credits.
T R 1:25–2:40. R. Brann.
For description, see Near Eastern Studies 234.

COM L 235 Modern Greek Poetry and Politics (also Classics 235 and Government 335)
Fall . 3 credits.
T R 1:25–2:40. G. Holst-Warhaft.
The history of modern Greece has been marked by a series of political crises that have resulted in deep divisions in society. Greek poetry has reflected these crises and divisions; the poetry of nineteenth- and twentieth-century Greece will thus be interpreted in its historical and political context. The course will concentrate on four periods in which the interaction has been particularly strong. The continuity of ancient Greek myths in modern Greek poetry will also be explored. Students taking this course as Government 335 for 4 credits must write an additional paper on a political topic.

COM L 236 Greek Mythology (also Classics 236) #
Fall and summer. 3 credits.
T R 11:40–12:55. D. Mankin.
A survey of the Greek myths, with emphasis on the reconstruction of the content and significance of the myths in preliterate Mediterranean society, including the place of myth in Greek life and consciousness; the factors and influences involved in the creation of myths; and the use of myths for our understanding of Greek literature, religion, and moral and political concepts.

COM L 302 Literature and Theory (also English 302/702)
Fall. 4 credits.
M WF 11:15–12:05. J. Culler.
A study of issues in contemporary theoretical debates, with attention to structuralism, deconstruction, historicism, psychoanalysis, and feminism. Readings by R. Barthes, J. Derrida, M. Foucault, B. Johnson, J. Rose, and others. No previous knowledge of literary theory is assumed.

COM L 320 Introduction to Caribbean Poetry @
Spring. 4 credits.
M W F 10:10–11. G. Davis.
The primary aim of this course is to introduce major authors and themes in Caribbean poetry against the background of the historical and cultural interactions between Europeans and people of African descent in the New World. Select masterworks of four contemporary poets will be the main focus of our detailed readings: Derek Walcott, Edward Brathwaite, Aimé Césaire, and Nicholás Guillén. Topics to be explored in class discussions will include the relation of "creole" to metropolitan languages, the problem of cultural identity, the postcolonial subject, the amalgamation of European and African cultural traditions, and the quest for an "authentic" Caribbean voice. In addition to the poetry, the class will study a small selection of West Indian novels and films that provide a concrete sense of place and social context (e.g., Jamaica Kincaid's *Annie John*; Jean Rhys' *Wide Sargasso Sea*; Eugene Palcy's film *Sugar-Cane Alley*).

[COM L 324 Law and Religion in the Bible (also Religious Studies 324)
Fall. 4 credits. Not offered 1992–93.
C. M. Carmichael.]

COM L 326 Christianity and Judaism (also Religious Studies 326) #
Spring. 4 credits. Not open to freshmen.
T R 8:40–9:55. C. M. Carmichael.
A study of the New Testament as a product of first-century Palestinian and Hellenistic Judaism. Other text (also in translation): Passover Haggadah.

COM L 328 Literature of the Old Testament (also Religious Studies 328) @#
Fall. 4 credits. Not open to freshmen.
T R 8:40–9:55. C. M. Carmichael.
Analysis of selected material in translation.

COM L 340 Twentieth-Century European Intellectual History (also History 354)
Fall. 4 credits.
T R 11:40–12:55. D. La Capra.
For description, see History 354.

COM L 350 Education and the Western Literary Tradition (also RussL 350 and College Scholar 350)
Spring. 4 credits.
T R 2:55–4:10. P. Carden.
For description, see Russian Literature 350.

COM L 354 Modern Drama (also Theatre Arts 327)
Spring. 4 credits.
T R 11:40–12:55. P. Hohendahl.

COM L 356 Renaissance Literature #
Fall. 4 credits.
M W F 1:25–2:15. W. Kennedy.
An introduction to Renaissance literary texts with some attention to cultural backgrounds and intellectual history. Readings from Machiavelli, Erasmus, Rabelais, Shakespeare, Cervantes, and others.

COM L 363–364 The European Novel (363#)
363, fall; 364, spring. 4 credits. Comparative Literature 363 and 364 may be taken independently of each other.
Fall: T R 10:10–11:25. N. Saccamano.
Spring: T R 10:10–11:25. Staff.
Close reading of some fifteen texts which essentially chart the course of the European novel. (The syllabus will follow generally but not strictly chronological lines, though the texts each term will be read in chronological order.) 363: Cervantes to Joyce. 364: Tolstoy to Mann. The novelists to be studied include Voltaire, Goethe, Stendhal, Balzac, Dickens, Flaubert, Dostoevsky, George Eliot, Hardy, Gide, and Kafka; readings include *Don Quixote, The Red and the Black, Madame Bovary, Crime and Punishment, Great Expectations, Middlemarch, The Mayor of Casterbridge, Portrait of the Artist as a Young Man, Death in Venice,* and *The Counterfeiters.* Analysis of novelistic subgenres: picaresque fiction, moral fable, fantasy, philosophical novel, *récit*, detective story, *Bildungsroman.* All texts to be read in English; students who command the pertinent foreign languages may, of course, read the books in the original.

COM L 365 The Contemporary Novel @
Spring. 4 credits. Core course for majors.
M W F 12:20–1:10. Staff.
A continuation of Comparative Literature 363–364 (The European Novel), surveying the period since the end of World War II and focusing on the global impact and transformations of an originally European form. Emphasis on the power relations among various languages, nations, social systems, and continents in the modern world system. Discussion of race and empire, as well as of gender and class. Possible readings: Mann, *Felix Krull*; Nabokov, *Lolita*; Enchi, *The Waiting Years*; Achebe, *Things Fall Apart*, García-Márquez, *One Hundred Years of Solitude*; El Saadawi, *God Dies by the Nile*; Rushdie, *Midnight's Children*; Kundera, *The Unbearable Lightness of Being*; Wang Anyi, *Bao Town.*

COM L 372 Selections from Contemporary World Literature
Fall. 4 credits. Core course for majors. Limited to 15.
T R 1:25–2:40. J. Monroe.
Readings of celebrated texts by contemporary authors with attention to the local and global contexts of their literary production and reception. The course will include works in various genres by such authors as Chinua Achebe, Isabel Allende, Edward Brathwaite,

Don DeLillo, Nadine Gordimer, Vaclev Havel, Kazuo Ishiguro, Amy Tan, and Christa Wolff.

[COM L 374 Contemporary Poetry and Society
Spring. 4 credits. Not offered 1992–93. Next offered 1993–94 as COM L 674.
T R 1:25–2:40. J. Monroe.]

COM L 375 Chekhov in the Context of Contemporary European Literature and Art (also Russian Literature 373) #
Spring. 4 credits.
T R 1:25–2:40. S. Senderovich.
For description, see Russian Literature 373.

[COM L 381 Marxist Cultural Theory (also German Studies 381 and Government 372)
Spring. 4 credits. Not offered 1992–93.
W. Cohen, P. Hohendahl.]

COM L 385 Reading Nabokov (also Russian Literature 385 and English 379)
Spring. 4 credits.
M W F 2:30. G. Shapiro.
For description, see Russian Literature 385.

COM L 402 Theories of Rhetoric (also Com L 602)
Spring. 4 credits.
T 2:30–4:25. W. Kennedy.
Reading and discussion of theories about rhetoric and its relation to literature and other forms of discourse. Texts by Plato, Longinus, Nietzsche, Derrida, and others.

COM L 404 History into Fiction: Nazis and the Literary Imagination (also English 404, NES 404 and JewSt 414)
Fall. 4 credits.
T R 11:40–12:55. E. Rosenberg.
The twelve years of Hitler's rule remain the most critical, "longest" years of the century. We shall read some seven or eight texts by Anglophone and Continental novelists (and a few playwrights and poets) that explore salient features of the regime: Hitler's rise to power (e.g., Mann's "Mario and the Magician," Brecht's *Arturo Ui*, Hughes's *Fox in the Attic*); civilian life in Nazi Germany (e.g., Isherwood's *Berlin Stories*, Grass's *Tin Drum*); World War II (Böll's fiction); the persecution of the European Jews (Sartre's "Childhood of a Leader," Brecht's "Jewish Wife," selections from Julian Barnes's novel *History of the World*; the Occupation (Camus's *The Plague*, Nabokov's "That in Aleppo"); the Holocaust (e.g., Weiss's *Investigation*, Borowski's *This Way for the Gas*, Spiegelman's *Maus I* or *Maus II*); lyrics by Celan, Nelly Sachs, Anthony Hecht. Brief ancillary selections by historians and memorialists (Arendt, Fest, Primo Levi, Bettelheim, Anne Frank); uses of documentary materials. Two short papers; no exam. Lmited enrollment.

COM L 410 Semiotics and Language (also French Romance Studies 400 and Linguistics 400)
Spring. 4 credits. Prerequisite: some background in an area relevant to semiotics: e.g., linguistics, philosophy, psychology, anthropology, or literature; or permission of instructor.
M W F 11:15–12:05. L. Waugh.
An introduction to the study of semiotics in general and to particular semiotic theories (e.g., those of Saussure, Peirce, Jakobson) and to language as a semiotic system. The particular topics to be discussed will depend on the interest of the students.

COM L 419–420 Independent Study
419, fall; 420, spring. Variable credit.
Comparative Literature 419 and 420 may be taken independently of each other.
Hours to be arranged. Staff.

COM L 421 Old Testament Seminar (also Religious Studies 421) @#
Fall. 4 credits. Limited to 20 students.
T 2:30–4:25. C. M. Carmichael.
Identification and discussion of problems in selected material from the Pentateuch.

COM L 426 New Testament Seminar (Religious Studies 426) #
Spring. 4 credits. Limited to 20 students.
T 2:30–4:25. C. M. Carmichael.
Identification and discussion of problems in the New Testament.

COM L 429 Readings in the New Testament (Near Eastern Studies 429, Religious Studies 429, and English 429) #
Fall. 4 credits.
M W F 12:20–1:10. J. P. Bishop.
Close readings of representative texts from the New Testament in modern scholarly editions, with the help of appropriate commentary, introductory and specialized. The focus for 1992 will be on Acts and the letters of Paul. All readings will be in English, but repeated reference to the Greek original will be made. Graduate students and undergraduates from other colleges who are interested in the material should not feel inhibited from enrolling. The approach will be primarily exegetical; that is, we will try to find out what the texts say and what they mean by what they say. Thus we can hope to stay open to scholarly and religious issues alike.

COM L 433 Theory of the Theatre and Drama (also Theatre Arts 431)
Fall. 4 credits.
T 10:10–12:35. M. Hays.
A survey of dramatic theory and theories of theatrical representation from Aristotle to the present.

COM L 434 Theatre and Society (also Theatre Arts 434)
Spring. 4 credits. Prerequisite: Permission of instructor or some work in theatre history or dramatic literature at the 300 level.
R 10:10–12:35. M. Hays.
Historical Drama: History in the theatre, the theatre in history!

COM L 439 Oral and Written Traditions in Africa (also French Literature 439 and Society for Humanities 439)
Fall. 4 credits.
T 10:10–11:25. J. Ngate.
Organized around but not limited to two major African epics, *Soundjata* and *Chaka*, this course will enable us to investigate the nature, validity, and the implications of many Francophone African writers' claim to being modern versions of the *griots* of the oral tradition. Reading knowledge of French recommended.

COM L 450 Renaissance Poetry (also Comparative Literature 650) #
Spring. 4 credits.
M 2:30–4:25. W. Kennedy.
A reading and discussion of key texts in lyric poetry from Italian, French, English, and other European literatures of the Renaissance. Topic for 1992: Petrarchan love poetry by women and homosexual poets. Texts by Stampa, Michelangelo, Labé, and Shakespeare.

COM L 451 Renaissance Epic (also Comparative Literature 651) #
Fall. 4 credits.
M 2:30–4:25. W. Kennedy.
A reading and discussion of key texts in narrative epic and chivalric romance from Italian, French, English, and other European literatures of the Renaissance. Topic for 1992: Ariosto, Rabelais, and Spenser.

[COM L 452 Renaissance Humanism (also Comparative Literature 652) #
Spring. 4 credits. Not offered 1992–93.
W 2:30–4:30. W. J. Kennedy.]

COM L 454 The Herodotean Moment (also Government 454) #
Fall. 4 credits.
T R 2:55–4:10. M. Bernal and J. Najemy.
The basic premise of the seminar is that the concept of Western civilization is a problematic one in need of critical analysis. The course will examine the historical evolution of the concept as seen in selected moments of actual and perceptual encounter with other civilizations. It will also inquire into the political uses and abuses of the concept, as well as its discursive, psychological, and anthropological dimensions.

[COM L 482 Latin American Women Writers (also Spanish Literature 492 and Women's Studies 481) @
Spring. 4 credits. Taught in English. Not offered 1992–93.
D. Castillo.]

COM L 493 Senior Essay
Fall and spring. 8 credits.
To be announced. Staff.
Hours to be arranged individually in consultation with the Director of Undergraduate Studies. Approximately fifty pages to be written over the course of two semesters in the student's senior year under the direction of the student's adviser. Credit for the first semester will be awarded upon completion of the second semester.

[COM L 498 Language Poetry (also English 466, Comparative Literature 698, and English 698)
Fall. 4 credits. Not offered 1992–93.
J. Monroe.]

COM L 617 The Ideology of Europe: Studies in Medieval Literature (also English 617)
Fall. 4 credits.
T 3:35–5:30. W. Cohen.
Medieval literature viewed through contemporary concerns about Eurocentrism, imperialism, and, secondarily, gender and class. The idea of Europe begins to acquire its present meaning in the Middle Ages. Drawing on the traditional historical and generic division of medieval narrative into epic, romance, and frame tale/allegorical dream vision, we'll investigate the logic of inclusions and exclusions characterizing that literature's conceptualization of Europe. Readings from both the core and periphery of western Europe: the *Mabinogion*, the *Ulster Cycle*, the *Elder Edda*, the *Song of Igor's Campaign*, *Diyenis Akritis*, the *Cid*, Eloise and Abelard, Chrétien, Wolfram, *Tirant lo Blanc*, the *1001 Nights*, Ibn Zabara, Boccaccio, and Chaucer, among others. Modern commentary from Auerbach, Bakhtin, Curtius, Todorov, etc. All texts available in English.

COM L 619–620 Independent Study
619, fall; 620, spring. Variable credit. Comparative Literature 619 and 620 may be taken independently of each other.
Hours to be arranged. Staff.

COM L 631 Seminar in Theatre History (also Theatre Arts 633)
Fall. 4 credits.
T 2:30–4:25. M. Hays.
Regarding the drama in nineteenth-century France, Germany, and England: Stages of historical change.

COM L 636 Seminar in Dramatic Criticism (also Theatre Arts 636)
Spring. 4 credits.
R 2:30–4:25. M. Hays.
From Lukács to Lyotard: Critical responses to the modern stage and its drama.

COM L 650 Renaissance Poetry (also Comparative Literature 450)
Spring. 4 credits.
M 2:30–4:25. W. Kennedy.
For description, see Comparative Literature 450.

COM L 651 Renaissance Epic (also Comparative Literature 451)
Fall. 4 credits.
M 2:30–4:25. W. Kennedy.
For description, see Comparative Literature 451.

[COM L 652 Renaissance Humanism (also Comparative Literature 452)
Spring. 4 credits. Not offered 1992–93.
W. J. Kennedy.]

COM L 673 Franz Kafka and the Problem of "Minor" Literature (also German Studies 673)
Fall. 4 credits. Reading knowledge of German essential. Videos will form part of the course.
T 12:20–2:15. S. L. Gilman.
This seminar will serve as an introduction to the study of cultural difference and the problem of a "minor" literature. Its initial focus will be the life and writings of Franz Kafka, but it will examine them in the context of the multicultural world of Prague culture. Central to its focus will be three aspects of Kafka's world: illness, "racial" identity, and sexuality. The interrelatedness of these three fields will be examined through a reading of a selection of Kafka's fictional works in conjunction with his diaries. Parallel readings will consist of selections from the fin-de-siècle medical literature on tuberculosis and race, on sexuality (especially the work of Christian Ehrenfels), on "racial" politics (Tomás Masaryk on the "blood libel," fin-de-siècle Zionist as well as Yiddish Socialist ['Bundist'] writing), and from the Czech literature (Malena Jesenská, Jaroslav Hasek) as well as German literature (Max Brod, Karl Kraus) which helped form Kafka's literary world. The second half of the semester will focus on echoes of the problem of Kafka and the meaning of a minor literature today. The first readings will encompass direct answers to Kafka such as Phillip Roth's and Nadine Gordimer's answers to Kafka's letter to his father. We will then turn to contemporary writings by Jews and Turks in Germany which reflect on many of the same questions of seeing oneself as marginal to the literary culture. Readings will include works by Esther Dischereit, Raphael Seligmann, Irene Dische, Maxim Biller, and Aras Ören.

COM L 675 After the Divide: German Critical Theory of the Seventies and Eighties (also German Studies 675 and History 675)
Fall. 4 credits.
T 2:30–4:25. P. U. Hohendahl.
The death of Theodor W. Adorno in 1969 marked the end of classical Critical Theory. During the following decade his students and disciples moved in different and conflicting directions. In this country, only the project of Jürgen Habermas has received serious and consistent attention. However, the German configuration of the 1980s is considerably more complex. The seminar examines the writings of H. M. Enzensberger, Habermas, O. Negt, A. Kluge, P. Bürger, A. Wellmer, and C. Dalhaus. Their works range from social and political theory to aesthetic theory and literary and music criticism.

COM L 679 Bertolt Brecht in Context (also German Studies 679 and Theatre Arts 679)
Spring. 4 credits. Requirements: seminar paper that will form the basis for an oral presentation for class discussion. Open to qualified undergraduates.
W 2:30–4:25. D. Bathrick.
Brecht's theory and dramatic praxis will be examined in the light of a two-fold context: (1) the relation of selected plays and writings to the historical contingencies of the Weimar and exile periods in which they emerged; (2) in later periods: an analysis of the reception and various readings (post-modernism, feminism, post-structuralism) of these same works by later writers and critical publics in Germany and the United States as a way of understanding the changing nature of aesthetic values in the postwar period. Special attention will be given to the importance of Marxism for Brecht's art, as well as the author's role as a representative of the cultural avant-garde.

COM L 682 Derrida, Writing, and the Institution of Literature (also English 680)
Spring. 4 credits.
T 10:10–12:00. J. Culler.
Study of selected writings of Jacques Derrida, from the early (*De la grammatologie*) to the most recent (*Donner le temps*), with particular emphasis on discussions of writing and literature. Reading knowledge of French is required, although most of the texts are available in English.

COM L 692 The Politics of Criticism (also German Studies 692 and Theatre Arts 692)
Fall. 4 credits.
M 2:30–4:25. D. Bathrick.
This course will offer an introduction to the recent debates within the area of literature and cultural studies around such subjects as canonicity and textuality, ethnic and minority studies, feminist and gender studies, literary interpretation, the role of theory, historical scholarship, interdisciplinary and cultural studies, and the role of the intellectual within the university. While close attention will be paid to evaluating critically individual methodological approaches (new criticism, post-structuralism, Marxism, feminist theory, New Historicism, etc.), of primary concern will be to focus on the conflicting philosophical, political, and institutional controversies that have emerged within the humanities concerning the future direction of the field as a whole. In focusing upon debates rather than the explication of individual theories, we shall seek to situate the evolution of critical discourses within the historical framework of social and institutional changes occurring since the early 1960s.

COM L 693 Freud in Latin America (also Romance Studies 693)
Fall. 4 credits.
T 2:30–4:25. J. Piedra.
A selection of basic and less basic Freud for readers applied to Spanish American prose. The main theme will be the implications of the Oedipal complex in the nation-formation mechanism, as exemplified by Spanish Americans' problematic relationship to Spanish as a Step-Mother Tongue, as well as to European intellectual paternalism and Uncle Sam's critical nepotism as theoretical Big Brothers. Besides the selective readings from Freud's opus and Freudian-trained Latin American theorists, we will study Spanish-American fiction with an Oedipal theme.

[COM L 698 Language Poetry (also English 698)
Fall. 4 credits. Not offered 1992–93.
J. Monroe.
For description, see Comparative Literature 498.]

COM L 721 Baroque Perspectives: Theory's Return to the Seventeenth Century (also English 721)
Fall. 4 credits.
M 1:25–3:20. T. Murray.
Whether in relation to commodity fetishism, the neoclassical "episteme," or the cinematic gaze, seventeenth-century British and French culture has attracted the attention of recent theory. In a way that may disturb the clear distinction between the "Renaissance" and the "baroque," the seminar will study the impact of recent theorizations of the "baroque" on critical conventions that distinguish the seventeenth century as a period of cultural transition. Why does seventeenth-century cultural production figure so prominently in recent history? How do specific forms and artifacts of cultural production provide the foundations for differing theoretical positions? And, of special concern, what are the ideological stakes of theory's strong interest in "baroque" constructs of vision and visuality?

Primary readings and visual artifacts from England and France will be selected to provide an overview of forms of seventeenth-century cultural production and theoretical approaches to the period, with an emphasis on those combining the interests of philosophy and psychoanalysis. Cultural artifacts and theoretical readings will be grouped to consider topics crucial to theory, such as: writing and authorship; melancholia and tragedy; colonialization and containment; the look and the gaze; the Medusa and witchcraft; and the garden of sexual difference. Course materials are likely to include *Hamlet* and *The Tempest*, the iconography of printed books by Montaigne, Jonson, and Hobbes, masques and theatrical performances in the courts of James I and Louis XIII (paying special attention to issues of colonialization and containment), French and English treatises on the emotions (from melancholia to witchcraft), selected visual works by Holbein, Bernini, Caravaggio, and Poussin, and materials from the popular press, as well as theoretical essays by Benjamin, Foucault, Lacan, Kristeva, Marin, Nancy, Deleuze, Dollimore, and Buci-Glucksmann. The course will include

discussion of two cinematic retheorizations of the "baroque": Jarman's *Caravaggio* and Greenaway's *Prospero's Books*.

COMPUTER SCIENCE

J. E. Hopcroft, chair; K. Birman, B. Bloom, T. Coleman, R. L. Constable, B. Donald, D. Gries, J. Hartmanis, T. Henzinger, D. Howe, D. Huttenlocher, D. Kozen, K. Marzullo, P. Pedersen, K. Pingali, G. Salton, F. B. Schneider, A. Segre, D. Subramanian, R. Teitelbaum, C. Tomasi, S. Toueg, N. Trefethan, C. Van Loan, S. Vavasis

The Department of Computer Science is in both the College of Arts and Sciences and the College of Engineering. A student in either college can major in computer science. The following describes the College of Arts and Sciences major.

The Major

The major has three components: a core (a minimum of 42 credits), a group of electives in computer science and related fields
(a minimum of 10 credits), and a concentration outside computer science (a minimum of 14 credits). The core focuses on the central topics within computer science: the logical design of programs, data structures, and algorithms. The remaining components of the major—the related electives and the outside concentration—provide a flexible extension to the core program. In consultation with their advisers, students are expected to choose electives and an outside concentration that best suit their graduate and career plans.

Students interested in pursuing an advanced degree in theoretical computer science should concentrate in mathematics. Students preparing for advanced work in scientific computation should take Computer Science 621 (instead of Computer Science 222) and Computer Science 622 (as a related elective) and concentrate in some branch of applied mathematics. Qualified students are encouraged to concurrently major in mathematics.

Admission

The prerequisites for admission to the major are:

1) Completion of Computer Science 100–211 (or 212)–280 (or equivalent)
2) Completion of Mathematics 111–122–221 or Mathematics 191–192–293
3) A 2.75 grade-point average in all computer science and mathematics courses
4) Acceptance by the department's admissions committee

After admission, students are expected to maintain at least a 2.75 grade-point average in their major courses. Any grade below C– in a core course or related elective is not acceptable.

Core

The core consists of the following courses:

1) Calculus and linear algebra: Mathematics 111–122–221–222 or 191–192–293–294
2) Programming and systems: Computer Science 100, 211 (or 212), 314, 410 and 414
3) Theory of computation: Computer Science 280, 381 (or 481), and 482. (One of the following may be substituted for Computer Science 280: Mathematics 332, 432, 434, or 481.)
4) Numerical analysis: Computer Science 222 or 421

Related Electives

The related electives requirement consists of three courses. One must be a computer science course or course/laboratory combination numbered above 400 that includes a substantial programming project, for example, Computer Science 412/413, 414/415, 417/418, 432/433, 462/463, or 472/473; the other two are to be selected from the following:

Electrical engineering courses numbered 301 or higher

Operations research courses numbered 260 or higher

Mathematics courses numbered 411 or higher

Computer Science courses numbered 400 or above (except Computer Science 413, 415, 418, 433, 463, 473, 600, 601, and seminar courses)

Students are expected to select related electives that complement their concentration.

Concentration

This component encourages the student to study some discipline outside of computer science in reasonable depth. The concentration consists of an approved sequence of four courses (at least 14 credits) numbered 200 or higher in some field related to the theoretical or practical aspects of computing. A list of approved concentrations is available in the Computer Science Undergraduate Office, 303 Upson Hall. Students may also design their own concentrations, subject to the approval of their adviser.

Other Requirements

Computer science majors must also satisfy the College of Arts and Sciences and university requirements. In particular, the spirit of the 15-credit electives requirement will be strictly followed. This requirement helps ensure breadth of education, and consequently no computer- or mathematics-related course can be used toward its fulfillment. In general, no courses may be used to fulfill more than one requirement. There are two exceptions: first, appropriate core courses may be used to satisfy the group IV distribution requirement, and second, in the case of a double major, the same course may be applied to both majors.

Probability and statistics courses. Computer science majors are encouraged to include at least one course in the field of probability and statistics in their program of study. Although there is no formal department of statistics at Cornell, the Department of Mathematics and the School of Operations Research and Industrial Engineering offer a wide range of probability and statistics courses suitable for computer science majors, including the following introductory two-course sequences:

Math 471, Basic Probability

Math 472, Statistics

OR&IE 260, Introductory Engineering Probability

OR&IE 370, Introduction to Statistical Theory with Engineering Applications

A less rigorous but satisfactory one-semester introduction to probability and statistics is given in either of:

Math 370, Elementary Statistics

OR&IE 270, Basic Engineering Statistics

Honors. A student may be granted honors in computer science on the recommendation of the Computer Science Undergraduate Committee. The committee guidelines will generally be the following:

1) An overall grade-point average of not less than 3.25
2) A grade-point average for all computer science courses of not less than 3.5
3) Satisfactory completion of at least two computer science courses numbered above 600 or satisfactory completion of a significant special investigation (Computer Science 490).

Courses

For complete course descriptions, see the computer science listing in the College of Engineering section.

COM S 100 Introduction to Computer Programming (also Engineering 100)
Fall, spring, or summer. 4 credits. Students who plan to take both Computer Science 101 or 102 and 100 must take 101 or 102 first.
2 lecs, 1 rec (optional). 3 evening exams.

COM S 101 The Computer Age
Fall or summer. 3 credits. Credit is granted for both Computer Science 100 and 101 only if 101 is taken first.
2 lecs, 1 rec. 1 evening exam.

COM S 107 An Introduction to SCHEME
Spring. 1 credit. Prerequisite: Introductory course in PASCAL, or equivalent programming experience.
3 lecs.

COM S 172 An Introduction to Artifical Intelligence
Spring. 3 credits. Prerequisites: Computer Science 100 or 101; and precalculus level math.
3 lecs, 2 evening exams.

COM S 211 Computers and Programming (also Engineering 211)
Fall, spring, or summer. 3 credits. Prerequisite: Computer Science 100 or equivalent programming experience. Credit will not be granted for both Computer Science 211 and Computer Science 212.
2 lecs, 1 rec. 2 evening exams.

COM S 212 Modes of Algorithmic Expression
Fall, spring. 4 credits. Prerequisite: Computer Science 100 or equivalent programming experience. Credit will not be granted for both Computer Science 211 and Computer Science 212.
2 lecs, 2 recs. 2 evening exams.

COM S 214 A Taste of C and UNIX
Fall, spring. 1–2 credits. Prerequisite: Computer Science 211, or equivalent programming experience.
3 lecs; 4 weeks (1 credit), 8 weeks (2 credits).

COM S 222 Introduction to Scientific Computation (also, Engineering 222)
Spring. 3 credits. Prerequisites: Computer Science 100 and pre/corequisite of Math 221 or Math 293.
2 lecs, 1 rec. 2 evening exams.

COM S 280 Discrete Structures
Fall or spring. 4 credits. Prerequisite: Computer Science 211 or 212 or permission of instructor.
3 lecs.

COM S 314 Introduction to Digital Systems and Computer Organization
Fall, spring, or summer. 4 credits. Prerequisite: Computer Science 211 or 212 or equivalent.
2 lecs, 1 sec. 2 evening exams.

COM S 381 Introduction to Theory of Computing
Fall. 4 credits. Prerequisite: Computer Science 280 or permission of instructor.
3 lecs.

COM S 400 The Science of Programming
Spring. 4 credits. Prerequisite: Computer Science 280 or equivalent.
3 lecs.

COM S 410 Data Structures
Fall or spring or summer. 4 credits. Prerequisite: Computer Science 280 or permission of instructor.
2 lecs. 2 evening exams.

COM S 411 Programming Languages and Logics
Fall. 4 credits. Enrollment limited. Prerequisites: Computer Science 410 or permission of instructor. Not offered every year.
2 lecs.

COM S 412 Introduction to Compilers and Translators
Spring. 3 credits. Prerequisites: Computer Science 314, 381, and 410. Corequisite: CS413.
2 lecs, 1 lab.

COM S 413 Practicum in Compilers and Translators
Spring. 2 credits. Prerequisites: Computer Science 314, 381, 410. Corequisite: Computer Science 412.
1 lab.
A compiler implementation project related to Computer Science 412.

COM S 414 Systems Programming and Operating Systems
Fall. 3 credits. Prerequisite: Computer Science 314 or permission of instructor.
2 lecs. 2 evening exams.

COM S 415 Practicum in Operating Systems
Fall. 2 credits. Prerequisite: Computer Science 410. Corequisite: Computer Science 414.
1 lec.

COM S 417 Computer Graphics and Visualization
Spring. 3 credits. Prerequisite: Computer Science 211 or 212. Not offered every year.
2 lecs. 1 lab.

COM S 418 Practicum in Computer Graphics
Spring. 2 credits. Prerequisite: Computer Science 211 or 212. Recommended: Computer Science 314. Corequisite: Computer Science 417. Not offered every year.
1 lab.

COM S 421 Numerical Analysis
Fall. 4 credits. Prerequisites: Mathematics 294 or equivalent, one additional mathematics course numbered 300 or above, and knowledge of programming.
3 lecs.

COM S 422/522 Parallel Computing for Scientific Problems
Spring. 4 credits.
Prerequisites: Computer Science 222 or Computer Science 421, knowledge of C and Fortran. Enrollment limited.
3 lecs.

COM S 432 Introduction To Database Systems
Spring. 3 credits. Prerequisites: Computer Science 211 or 212 and Computer Science 410, or permission of instructor. Recommended: Computer Science 314.
2 lecs. 1 rec.

COM S 433 Practicum in Database Systems
Spring. 2 credits. Corequisite: Computer Science 432.
1 lab.

COM S 444 Distributed Systems and Algorithms
Fall. 4 credits. Co-requisite: CS414 or permission of instructor.
2 lecs.

COM S 462 Robotics and Machine Vision
Spring. 3 credits.
Prerequisite: Permission of instructor, Computer Science 410 and Computer Science 381. Co-requisite: Computer Science 463.
3 lecs.

COM S 463 Robotics and Machine Vision Lab
Spring. 2 credits.
Prerequisites: Permission of instructor, Computer Science 410 and Computer Science 381. Co-requisite: Computer Science 462.
1 lab.

COM S 472 Foundations of Artificial Intelligence
Fall. 3 credits. Prerequisites: Computer Science 107 or 212, Computer Science 280 and Computer Science 410. Open to juniors, seniors, and graduate students.
2 lecs, 1 sec.

COM S 473 Practicum in Artificial Intelligence
Fall. 2 credits. Prerequisites: Computer Science 107 or 212, Computer Science 280 and 410. Corequisite: Computer Science 472.
1 lab.

COM S 481 Introduction to Theory of Computing
Fall. 4 credits. Prerequisite: Computer Science 280 or permission of instructor. Credit will not be granted for both Computer Science 381 and Computer Science 481.
3 lecs.
A faster-moving and deeper version of Computer Science 381. Corrective transfers between Computer Science 481 and 381 (in either direction) are encouraged during the first few weeks of instruction.

COM S 482 Introduction to Analysis of Algorithms
Spring. 4 credits. Prerequisites: Computer Science 410 and Computer Science 381 or 481, or permission of instructor.
3 lecs.

[COM S 486 Applied Logic (also Mathematics 486)
Fall or summer. 4 credits. Prerequisites: Mathematics 222 or 294, Computer Science 100, and some course in mathematics or theoretical computer science. Not offered every year.
2 lecs, 1 lab to be arranged.]

COM S 490 Independent Reading and Research
Fall or spring. 1–4 credits.

COM S 511 Modern Programming Languages
Spring. 4 credits. Prerequisites: Computer Science 410 and a project course or permission of instructor.
3 lecs.

COM S 514 Practical Distributed Computing
Spring. 4 credits. Prerequisites: Computer Science 414 or permission of instructor.

COM S 572 Artificial Intelligence Programming
Fall. 4 credits. Prerequisite: Computer Science 472 or permission of instructor.
3 lecs.

COM S 600 Computer Science and Programming
Fall. 1 credit. Prerequisite: graduate standing in computer science or permission of instructor.
1 lec.

COM S 611 Advanced Programming Languages
Fall. 4 credits. Prerequisites: Computer Science 410, and 381 or 481, or permission of instructor.
3 lecs.

COM S 612 Compiler Design for High-Performance Architectures
Spring. 4 credits. Prerequisites: Computer Science 314 and 412, or permission of instructor.
3 lecs.

COM S 613 Concurrent Programming
Fall. 4 credits. Prerequisites: Computer Science 414 or permission of instructor.
3 lecs.

COM S 614 Advanced Systems
Spring. 4 credits. Prerequisite: Computer Science 414 or permission of instructor.
2 lecs.

COM S 621 Matrix Computations
Fall. 4 credits. Prerequisites: Mathematics 411 and 431 or permission of instructor.
3 lecs.

COM S 622 Numerical Optimization and Nonlinear Algebraic Equations
Spring. 4 credits. Prerequisite: Computer Science 621.
3 lecs.

COM S 624 Numerical Solution of Differential Equations
Spring. 4 credits. Prerequisite: Previous exposure to numerical analysis, mathematical analysis including Fourier methods, and differential equations.

COM S 635 Automatic Text Processing and Information Retrieval
Spring. 4 credits. Prerequisite: Computer Science 410 or equivalent or permission of instructor.
2 lecs.

COM S 661 Robotics
Fall. 4 credits. Prerequisites: Computer Science 482 and permission of instructor. Not offered every year.
3 lecs.

[COM S 662 Robotics Laboratory
Fall. 1 credit. Prerequisite: graduate standing or permission of instructor. Not offered every year.
1 lab.]

COM S 664 Machine Vision
Spring. 4 credits. Prerequisites: undergraduate-level understanding of algorithms and Mathematics 221 or equivalent.
3 lecs.

COM S 671 Introduction to Automated Reasoning
Fall. 4 credits. Prerequisites: Computer Science 611 and 681 and Mathematics 581. Not offered every year.
3 lecs.

COM S 672 Advanced Artificial Intelligence
Spring. 4 credits. Prerequisites: Computer Science 472 or permission of instructor.
2 lecs.

COM S 681 Analysis of Algorithms
Fall. 4 credits. Prerequisite: Computer Science 381 or 481, or permission of instructor.
3 lecs.

COM S 682 Theory of Computing
Spring. 4 credits. Prerequisite: Computer Science 381 or 481, or permission of instructor.
3 lecs.

COM S 684 Introduction to Symbolic Computation
Spring. 4 credits.
Prerequisites: Computer Science 381 or 481, or permission of instructor.

COM S 709 Computer Science Graduate Seminar
Fall or spring. 1 credit. S-U grades only. For staff, visitors, and graduate students interested in computer science.

COM S 711 Topics in Programming Languages and Systems
Spring. 4 credits. Prerequisites: Computer Science 381 or 481 and Computer Science 611, or permission of instructor. Not offered every year.
2 lecs.

[COM S 712 Topics in Programming Languages and Systems
Spring. 4 credits. Prerequisite: Computer Science 612 or permission of instructor. Not offered every year.
2 lecs.]

COM S 713 Seminar in Systems and Methodology
Fall or spring. 4 credits. Prerequisites: Computer Science 414 and an advanced systems course such as CS 613, 614, 632, or 643, or permission of instructor. Not offered every year.
2 lecs.

[COM S 714 Distributed Computing
Spring. 4 credits. Prerequisites: Computer Science 414 and an advanced systems course (e.g., Computer Science 613, 614, 632, or 643) or permission of instructor. Not offered every year.
2 lecs.]

COM S 715 Seminar in Programming Refinement Logics
Fall or spring. 4 credits. Prerequisite: permission of instructor.

COM S 717 Topics in Parallel Architectures
Fall. 4 credits. Prerequisite: Computer Science 612 or permission of instructor. Not offered every year.
2 lecs.

COM S 719 Seminar in Programming Languages
Fall or spring. 4 credits. Prerequisite: Computer Science 611 or permission of instructor. S-U grades only.

COM S 721 Topics in Numerical Analysis
Fall. 4 credits. Prerequisite: Computer Science 621 or 622, or permission of instructor. Not offered every year.
2 lecs.

COM S 722 Topics in Numerical Analysis
Spring. 4 credits. Prerequisite: Computer Science 621 or 622 or permission of instructor. Not offered every year.
2 lecs.

COM S 729 Seminar in Numerical Analysis
Fall or spring. 1–4 credits (to be arranged). Prerequisite: permission of instructor. S-U grades only.

[COM S 733 Selected Topics in Information Processing
Not offered every year.
2 lecs.]

COM S 739 Seminar in Text Processing and Information Retrieval
Fall or spring. Credit to be arranged. Prerequisite: Computer Science 635 or permission of instructor. S-U grades only.

[COM S 743 Topics in Fault-Tolerant Distributed Computing
Prerequisite: Computer Science 614, 643, or 714. Not offered every year.
1 lec.]

COM S 747 Seminar in Program Logic and Semantics
4 credits. Prerequisite: permission of instructor. S-U grades only. Not offered every year.

COM S 749 Seminar in Systems Modeling and Analysis
Fall or spring. 4 credits. Prerequisite: permission of instructor. Not offered every year.

COM S 753 Seminar on Work in Progress in Distributed Systems
Fall and spring. 1 credit. Prerequisite: permission of the instructor.

[COM S 762 Robot Cafe
Spring. 4 credits. Prerequisite: CS661. Advanced seminar on varying topics.]

[COM S 771 Topics in Artificial Intelligence
4 credits. Prerequisite: permission of instructor. Not offered every year.]

COM S 772 Seminar in Advanced Robotics
4 credits. Prerequisite: permission of instructor. Not offered every year.

COM S 774 Proseminar in Cognitive Studies II (also Cognitive Studies 774 and Linguistics 774)
Spring. 4 credits. Prerequisite: permission of instructor.

COM S 779 Seminar in Machine Learning
Fall or spring. Credit to be arranged. Prerequisite: permission of instructor. S-U grades only.

[COM S 781 Topics in Analysis of Algorithms and Theory of Computing
Fall. 4 credits. Prerequisites: Computer Science 681 and 682 or permission of instructor. S-U grades only. Not offered every year.
2 lecs.]

[COM S 782 Topics in Analysis of Algorithms and Theory of Computing
Spring. 4 credits. Prerequisites: Computer Science 681 and 682 or permission of instructor. S-U grades only. Not offered every year.
2 lecs.]

COM S 784 Seminar in Computational Algebra
Informal weekly seminar in which current topics in computational algebra and symbolic mathematics are discussed.

COM S 789 Seminar in Theory of Algorithms and Computing
Fall, spring. 2–4 credits. Prerequisite: permission of instructor. S-U grades only.

COM S 790 Special Investigations in Computer Science
Fall, spring. Prerequisite: permission of a computer science adviser. Letter grade only. Independent research or Master of Engineering project.

COM S 890 Special Investigations in Computer Science
Fall, spring. Prerequisite: permission of a computer science adviser. S-U grades only. Master of Science degree research.

COM S 990 Special Investigations in Computer Science
Fall, spring. Prerequisite: permission of a computer science adviser. S-U grades only. Doctoral research.

DANCE

See listings under Department of Theatre Arts.

DUTCH

See Modern Languages and Linguistics.

ECONOMICS

D. Easley, chair; R. Masson, graduate field representative; U. Possen, director of undergraduate studies; L. Blume, T. E. Davis, R. Ehrenberg, G. Fields, E. Fisher, R. Frank, G. Hay, M. Kelly, N. Kiefer, P. Legros, T. Lyons, P. D. McClelland, M. Majumdar, J. Mitchell, T. Mitra, R. E. Schuler, K. Shell, B. Smith, G. J. Staller, E. Thorbecke, J. Vanek, H. Y. Wan, Jr., J. Wissink. Emeritus: W. Isard, A. Kahn, P. O'Leary, S. Tsiang

The study of economics provides an understanding of the way economies operate and an insight into public issues. The department offers a broad range of undergraduate courses in such fields as money and banking international and comparative economics; econometrics; theory; history; growth and development; and the organization, performance, and control of industry.

Social Science Distribution Requirement

The microeconomics distribution requirement can be fulfilled with any of the following:

Economics 101, Economics 201, Economics 203, or Economics 313.

The macroeconomics distribution requirement can be satisfied with any of the following:

Economics 102, Economics 202, Economics 204, or Economics 314.

The Major

Students who wish to major in economics must have completed Economics 101 or Economics 203 and Economics 102 or Economics 204 or equivalent courses, and Mathematics 111, or its equivalent. A grade below a C will not be accepted for any of the above. Economics 203 (with a grade of B or better) satisfies both the introductory micro (Economics 101) and the intermediate micro (Economics 313) requirement. Similarly Economics 204 (with a grade of B or better) satisfies both the introductory macro (Economics 102) and intermediate macro (Economics 314) requirement.

Prospective majors should apply at the department office.

The requirements for the major beyond the introductory courses and Math 111 are: (1) Economics 313 or Economics 203, (2) Economics 314 or Economics 204, (3) Economics 319 or Economics 321, and (4) 20 credits of other economics courses listed by the Department of Economics, except that Economics 399 (independent study) and/or Economics, 499 (honors program) will not count toward the 20-credit requirement. With the permission of the major adviser, one or (in exceptional cases) two economics courses offered outside the College of Arts and Sciences may be applied to fulfill this requirement. Only courses in which a student receives a grade of C– or better will be counted towards satisfying the major requirements.

An honors program is currently being offered. Students should consult the director of undergraduate studies before May of their junior year for more information.

Students planning graduate work in economics or business are strongly encouraged to prepare themselves well in mathematics and econometrics. These students are strongly encouraged to enroll in Economics 319–320 rather than Economics 321.

Courses

ECON 101 Introductory Microeconomics
Fall, spring, or summer. 3 credits. Economics 101 is not a prerequisite for 102.
Lecs and disc.
Explanation and evaluation of how the price system operates in determining what goods are produced, how goods are produced, and who receives income, and how the price system is modified and influenced by private organizations and government policy.

ECON 102 Introductory Macroeconomics
Fall, spring, or summer. 3 credits. Economics 101 is not a prerequisite for 102.
Lecs and disc.
Analysis of aggregate economic activity in relation to the level, stability, and growth of national income. Topics discussed may include the determination and effects of unemployment, inflation, balance of payments, deficits, and economic development, and how these may be influenced by monetary, fiscal, and other policies.

ECON 105 Principles of Accounting
Summer only. 3 credits.
The principles of accounting essential to an understanding of cost control. Cost accounting: analysis and interpretation of financial statements.

ECON 201 Introduction to the American Economy
Fall. 3 credits. Prerequisites: not open to students who have taken any prior economics courses at Cornell.
This course is intended for students who do not plan to take advanced courses in economics. The sequence Economics 201–202 covers the same topics as are taught in Economics 101–102. The course is designed to teach the basic knowledge of economics needed to understand how economic systems function, but it will emphasize analysis of current issues. The meetings of the class are arranged by topic and will be taught by senior faculty members who specialize in the particular topics.

ECON 202 Introduction to the World Economy
Spring. 3 credits. Prerequisites: not open to students who have taken any prior economics courses at Cornell.
This course is intended for students who do not plan to take advanced courses in economics. A continuation of Economics 201 with a focus on international issues.

ECON 203 Microeconomics
Fall. 4 credits. Prerequisite: calculus.
Intended for students with strong analytical skills who have not taken Economics 101, 102, 201, or 202. Can be used to replace both Economics 101 and 313. (Can replace 313 only with grade of B or better). This course covers the topics taught in Economics 101 and 313. An introduction to the theory of consumer and producer behavior and to the functioning of the price system.

ECON 204 Macroeconomics
Spring. 4 credits. Prerequisite: Economics 203.
Intended for students with strong analytical skills who have not taken Economics 101, 102, 201, or 202. Can be used to replace both Economics 102 and 314. This course covers the topics taught in Economics 102 and 314. (Can replace 314 only with grade of B or better). An introduction to the theory of national income determination, unemployment, growth, and inflation.

ECON 205 Managerial Accounting for Planning and Control
Summer only. 3 credits. Prerequisite: a course in accounting or equivalent experience or permission of instructor.
An extension of Economics 105. Considers the accounting process primarily from a managerial rather than a financial point of view. The basics of accounting systems and financial statements are reviewed and extended to provide a basis for comparing financial and managerial perspectives. Manufacturing cost systems, operational budgeting, standard costing, and short-term managerial decision making.

ECON 301 Economics of Market Failure
Fall. 4 credits. Prerequisites: Economics 101–102.
The course will review briefly the welfare properties of the perfectly competitive market model and will then consider a range of situations in which these properties are modified and where there may be a case for some form of government intervention. The cases to be considered will include (a) the presence of externalities, pollution, and the economics of the environment; (b) the provision of public goods, the free-rider problem; (c) uncertainty and imperfect information, an analysis in the context of labor and insurance markets, and the market for medical care; (d) the regulation of natural monopoly and public utility pricing; (e) the failure of the market to achieve desired redistributional objectives; (f) direct and indirect taxation as instruments of redistribution.

ECON 303 Positive and Normative Theories of Income Distribution
Spring. 4 credits. Enrollment limited. Prerequisite: permission of instructor. Cannot be applied to the major.
After examining the distinction between the terms positive and normative as used in economics, this course will explore three main questions: (1) Why is income distributed the way it is? (2) How should income be distributed? (3) What is the relationship between 1 and 2? Particular emphasis will be given to those theories of income distribution, both positive and normative, that tend to dominate discussion of these topics in America.

ECON 304 Economics and the Law
Fall. 4 credits. Prerequisite: Economics 101.
An examination, through the lens of economic analysis, of legal principles drawn from various branches of law, including contracts, torts, and property. Cases are assigned for class discussion; in addition, there are several writing assignments.

ECON 306 Economics of Defense Spending
Spring. 4 credits. Prerequisites: Economics 101–102.
The economic aspects of defense spending are analyzed. Emphasis is on the procurement of weapons systems. Topics covered include an overview of the defense budget, special characteristics of the defense market, the structure of the defense industry, and the economic behavior of defense firms.

ECON 308 Economic Analysis of Government (also Civil and Environmental Engineering 322)
Spring. 4 credits. Prerequisites: calculus plus Economics 313 or equivalent or Civil and Environmental Engineering 321.
Analysis of economic bases for government intervention in a market economy. Topics include public goods, cost-benefit analysis, public finance, environment regulation and risk management, and macroeconomic topics.

ECON 309 Environmental Economics
Spring. 4 credits. Prerequisites: Economics 101–102.
This course examines the economic aspects of environmental issues. We will look at theoretical and analytical tools of economics as they apply to environmental issues, as well as related philosophical and ethical issues. We will then apply the various economic and ethical paradigms to current environmental issues.

ECON 313 Intermediate Macroeconomic Theory (also ENGRG 321)
Fall, spring, or summer. 4 credits. Prerequisites: Economics 101–102 and calculus.
The pricing process in a private enterprise economy are analyzed under varying competitive conditions, and their role in the allocation of resources and the functional distribution of national income is considered.

ECON 314 Intermediate Microeconomic Theory
Fall, spring, or summer. 4 credits. Prerequisites: Economics 101–102 and calculus.
The theory of national income and determination and economic growth in alternative models of the national economy is introduced. The interaction and relation of aspects of these models of empirical aggregate economic analysis is examined.

ECON 315 History of Economic Analysis
Fall. 4 credits. Prerequisites: Economics 101–102 or permission of instructor.
Early writings in economics and their relationship to current economic analysis and policy issues, for example, ancient and medieval philosophers on justice in exchange; mercantilist arguments for trade protection: early theories about the effect of monetary expansion (D. Hume); the role of the entrepreneur (Cantillon); and general competitive equilibrium (the Physiocrats). The most recent reading assignment in this course is Adam Smith's Wealth of Nations but the emphasis is on the relationship between the precursors of Adam Smith and his Wealth of Nations to modern economics analysis and current efforts to answer some of the questions raised in the early writing on economics.

ECON 317 Intermediate Mathematical Economics I
Fall. 4 credits. Prerequisites: Economics 101–102 and Math 111–112.
Introduction of calculus and matrix algebra; problems of maximization of a function of several variables. Economic examples are used to illustrate and teach the mathematical concepts.

ECON 318 Intermediate Mathematical Economics II
Spring. 4 credits. Prerequisites: Economics 101–102 and Math 111–112.
Advanced techniques of optimization and application to economic theory.

ECON 319 Introduction to Statistics and Probability
Fall or summer. 4 credits. Prerequisites: Economics 101–102 and Mathematics 111–112).
This course provides an introduction to statistical inference and to principles of probability. It includes descriptive statistics, principles of probability, discrete and continuous distributions, and hypothesis testing (of sample means, proportions, variance). Regression analysis and correlation are introduced.

ECON 320 Introduction to Econometrics
Spring or summer. 4 credits. Prerequisites: Economics 101–102, 319, or equivalent.
Introduction to the theory and application of econometric techniques. How econometric models are formulated, estimated, used to test hypotheses, and used to forecast; understanding economists' results in studies using regression model, multiple regression model, and introduction to simultaneous equation models.

ECON 321 Applied Econometrics
Fall or spring. 4 credits. Prerequisites: Economics 101–102 and calculus.
This course provides an introduction to statistical methods and principles of probability. Topics to be covered include analysis of data, probability concepts and distributions, estimation and hypothesis testing, regression, correlation and time series analysis. Applications from economics are used to illustrate the methods covered in the course.

ECON 323 American Economic History
Fall. 4 credits.
Problems in American economic history from the first settlements to early industrialization are surveyed.

ECON 324 American Economic History
Spring. 4 credits. Prerequisites: Economics 101–102 or permission of instructor.
A survey of problems in American economic history from the Civil War to World War I.

ECON 325 Economic History of Latin America @
Spring. 4 credits. A survey of changing economic institutions and policies from pre-Columbian to modern times.

ECON 326 History of American Enterprise
Spring. 4 credits. Prerequisites: Economics 101–102 or equivalents.
History of the changing structure of American business from 1800 to the present, with major emphasis upon developments after the Civil War. The focus of the course will be the changing structure of challenges (for example, the rise of unions, development of a national capital market, changing role of government) and the various responses of business organizations and entrepreneurs to those challenges.

ECON 329 Eastern Europe Today: Economics, Government, Culture (also Government 326 and Russian 329)
Fall. 4 credits.
Economics majors cannot use this course to fulfill major requirements. Introductory interdisciplinary survey of Poland, Hungary, Czechoslovakia, and Yugoslavia since World War II, with emphasis on contemporary development.

ECON 330 The Soviet Union: Politics, Economics, and Culture (also Government 330 and Russian 330)
Spring. 4 credits.
Economics majors cannot use this course to fulfill major requirements. Interdisciplinary survey of the USSR since the Revolution, with emphasis on contemporary developments.

ECON 331 Money and Credit
Fall. 4 credits. Prerequisites: Economics 101–102 and 314.
A systematic treatment of the determinants of the money supply and the volume of credit. Economic analysis of credit markets and financial institutions in the United States.

ECON 333 Financial Economics
Spring. 4 credits. Prerequisites: Economics 313 and 314.
The theory and decision making in the presence of uncertainty and the practical aspects of particular asset markets are examined.

ECON 335 Public Finance: The Microeconomics of Government
Fall. 4 credits. Prerequisites: Economics 101–102 and 313, or their equivalent, and one semester of calculus.
The role of government in a free market economy is analyzed. Topics covered include public goods, market failures, allocation mechanisms, optimal taxation, effects of taxation, and benefit-cost analysis. Current topics of an applied nature will vary from term to term.

ECON 336 Public Finance: Resource Allocation and Fiscal Policy
Spring. 4 credits. Prerequisites: Economics 101–102, 313 or their equivalent and one semester of calculus.
This course covers the revenue side of public finance and special topics. Subjects covered include the federal debt, the budget, and government regulation and transfers, as well as problems like local public goods, health care, education, the hierarchy of governmental structure, plus a variety of applied problems.

ECON 338 Macroeconomic Policy
Fall or spring. 4 credits. Prerequisite: Economics 314 or equivalent.
The use of fiscal and monetary policies for achieving full employment, price-level stability, and appropriate economic growth are studied.

ECON 341 Labor Economics
Fall. 4 credits. Prerequisites: Economics 101–102.

ECON 342 Economic Analysis of the University
Spring. 4 credits. Prerequisite: ILR 240 or 313 or their equivalent.
This course seeks to illustrate the complexity of decision making in a nonprofit organization and to show how microeconomic analysis in general, and labor market analysis in particular, can be usefully applied to analyze resource allocation decisions at universities. Among the topics covered are financial aid, tuition, and admissions policies, endowment policies, faculty salary determination, the tenure system, mandatory retirement policies, merit pay, affirmative action, comparable worth, collective bargaining, resource allocation across and within departments, undergraduate versus graduate education, research costs, libraries, athletics, and "socially responsible" policies.

ECON 351 Industrial Organization
Fall. 4 credits. Prerequisite: Economics 313 or its equivalent.
A study of markets that differ from the ideal of perfect competition (e.g., monopoly and oligopoly) and the efforts of our legal system through the antitrust laws to deal with the kinds of problems that arise in such markets. Specific topics covered include mergers, price fixing, price discrimination, predatory pricing, and vertical restraints such as resale price maintenance.

ECON 352 Advanced Topics in Industrial Organization
Spring. 4 credits. Prerequisites: Economics 351.
This course is an extension of 351 and will emphasize (a) more-advanced topics in the theory of industrial organization with special attention to recent developments in the literature; and (b) empirical analysis of numerous issues relating to the structure of markets and their performance.

ECON 354 Economics of Regulation
Fall or spring. 4 credits. Prerequisite: Economics 313 or equivalent or Civil and Environmental Engineering 321.
Explores technological bases for government intervention in the private market economy, which include decreasing cost industries (natural monopolies) and technical externalities (pollution and risk). The economic implications of regulating electric, gas, and communications and transportation utilities, including pricing, service quality, efficiency incentives, and long-range planning issues, are examined in detail. Topics on environmental protection and societal risk management are also explored.

ECON 355 Departures from Rational Choice
Fall. 4 credits. Prerequisites: Economics 313 and 314, or their equivalents.
This course examines behaviors that appear inconsistent with the traditional theory of rational choice. These behaviors fall under two broad categories: (1) irrational behavior with regret, and (2) irrational behavior without regret. The first category includes, but is not limited to, behaviors that result from cognitive errors. Once people are made aware of these errors, they typically express a desire to modify their behavior in the directions called for by rational choice theory. The second category represents a deeper challenge to the traditional model. It consists of behaviors that people generally express no desire to modify despite their inconsistency with rational choice theory.

ECON 357 Game Theory
Spring. 4 credits. Prerequisites: Economics 313 and 319.
This course studies mathematical models of conflict and cooperation in situations of uncertainty (about nature and about decision makers).

ECON 361 International Trade Theory and Policy
Fall. 4 credits. Prerequisites: Economics 101–102 and 313.
This course surveys the sources of comparative advantage. It studies commerical policy and analyzes the welfare economics of trade between countries. Some attention is paid to the institutional aspects of the world trading system.

ECON 362 International Monetary Theory and Policy
Spring. 4 credits. Prerequisites: Economics 101–102 and 314.
This course surveys the determination of exchange rates and theories of balance of payments adjustments. It also explores open economy macroeconomics, and it analyzes some of the institutional details of foreign exchange markets, balance of payments accounting, and the international monetary system.

ECON 363 International Economics
Fall. 4 credits. Prerequisite: Economics 101–102 or equivalent.
This course surveys international economics in one semester. First, it surveys the sources of comparative advantage, and it analyzes commercial policy and the institutional aspects of the world trading system. Second, it discusses exchange rates, and it studies theories of balance of payments adjustments. This course is intended primarily for government majors who are comfortable with a less technical approach to international economics.

ECON 365 Economic Problems of Latin America @
Fall or spring. 4 credits. Prerequisites: Economics 101–102.
Current topics include, international debt, capital flight, economic integration, stabilization programs, etc.

ECON 366 The Economy of the Soviet Union
Fall. 4 credits. Prerequisites: Economics 101–102.
A brief survey of the Soviet economic system and development since 1917. Economic slowdown in the seventies and Gorbachev's rise to power are analyzed along with attempts at reforms, systemic change, and consideration of nation republics.

ECON 367 Comparative Economic Systems: Soviet Union and Europe
Fall. 4 credits. Prerequisites: Economics 101–102.
Discussion of approaches to comparisons of economic systems. Consideration of models (market economy, central planning, Socialist market economics) as well as national economies: United States, France, Sweden, former Soviet Union, Yugoslavia, Hungary, Poland, and Czechoslovakia are explored.

ECON 369 The Economy of China @
Fall. 4 credits. Prerequisites: Economics 101–102 or permission of instructor.
Examines the development of the Chinese economy and the evolution of China's economic system since 1949.

ECON 370 Socialist Economies in Transition
Fall. 4 credits. Prerequisites: Economics 101–102 and 313–314.
This course studies the economic aspects of the transition of centrally planned, socialist economies to capitalist, market economies. It begins with an overview of the functioning of centrally planned economies, the arguments for reform, and experience with reform of these economies prior to 1989. This background section provides an understanding of the issues relating to reform. The focus then shifts to the current transitions in the East European countries. We examine the key elements of the reform process, including macroeconomic stabilization and price liberalization, tax reform, development of capital markets, and privatization of firms. We study the economic arguments relating to each of these aspects of reform and compare experiences with reform in the countries of Eastern Europe.

ECON 371 Economic Development
Fall. 4 credits. Prerequisites: Economics 313 or equivalent.
Study of the problem of sustaining accelerated economic growth in less-developed countries. Trade-offs between growth, welfare, and equity; the legacy of colonialism; relevance of history and economic theory; problems of capital formation, economic planning and international specialization; and the interaction of industrialization, agricultural development, and population change are emphasized.

ECON 372 Applied Economic Development
Fall or spring. 4 credits. Prerequisite: Economics 313.

ECON 374 National and International Food Economics (also Nutritional Sciences 457)
Spring. 4 credits. Prerequisites: a college course in economics and junior standing or permission of instructor.
Examination of individual components essential for an understanding of the U.S. and world food economies. Analysis of the world food economy. Review and analysis of (a) the major economic factors determining the demand for food, the composition of food consumption, and nutritional intake; and (b) the major economic factors affecting food production and supply. Examination and evaluation of the effectiveness of various food policies and programs in altering food consumption patterns. Principles of nutritional planning in developing countries within the context of the process of economic and social development.

ECON 381 Economics of Participation and Workers' Management
Spring. 4 credits. Prerequisites: Economics 313–314 or permission of instructor.
The theory of labor-management economies is developed systematically, and literature on that and related subjects surveyed. Theories of the participatory firm, industry, and general equilibrium are covered together with a microeconomic theory and analysis of special dimensions of the system. Efficient decision-making processes within the firm are also studied. Illustrative references to Yugoslavia and other real instances of labor participation are made throughout.

ECON 382 The Practice and Implementation of Self-Management
Fall. 4 credits. Prerequisites: Economics 101–102.
A broad introduction to the subject of workers' self-management intended for both economists and non-economists. It contains no technical tools nor does it require prior professional knowledge: thus there are no prerequisites. The course objective is to answer 5 broad questions: (1) What is self-management? (2) Where and in what form does it occur? (3) What is its history? (4) How does it work? and (5) How is a cooperative enterprise/economy started/operated?

ECON 399 Readings in Economics
Fall or spring. Variable credit.
Independent study.

ECON 416 Intertemporal Economics
Fall. 4 credits. Prerequisites: Economics 313.
This course is intended for advanced economics majors who are especially interested in economic theory. Topics to be covered: (a) review of the one good Ramsey model of optimal savings and accumulation; conditions for intertemporal efficiency in production; comparative dynamics and sensitivity analysis; (b) some earlier models of capital accumulation; the roles of present value and internal rate of return in guiding investment decisions; (c) growth, exhaustible resources; pollution and conservation: discussion of the trade-offs facing a society.

ECON 419 Economic Decisions under Uncertainty
Fall. 4 credits. Prerequisites: Economics 313 and 319.
This course provides an introduction to the theory of decision making under uncertainty with emphasis on economic applications of the theory.

ECON 445 Topics in Microeconomic Analysis—Markets and Planning
Fall or spring. 4 credits. Prerequisites: Economics 313.
This is a course of economic theory designed for upperclass undergraduates. Course contents may vary from year to year. Issues that may be examined include (1) How can economic activities be efficiently organized through the market mechanism? Why is the presence of many traders essential to efficiency? (2) What can be done if the indivisibility in production processes becomes an important hindrance to competitive pricing? (3) How can economic planning be decentralized efficiently? This course serves two purposes: (1) to introduce concepts that are novel to undergraduates and relevant to public policy but require only a modicum of analytic tooling up, and (2) to illustrate the deductive approach of modern economic analysis—how to define concepts unambiguously, how to form propositions in clear-cut fashion, and how to follow up logical implications sequentially to the conclusion.

ECON 446 Topics in Macroeconomic Analysis—Is Keynesianism Dead?
Fall or spring. 4 credits. Prerequisites: Economics 314.
The coverage of this course may vary from term to term. Presently the content of the course deals with the range of criticisms against Keynesian theory by the New Classical Economics, alias the Equilibrium School, alias the Rational Expectations School. Despite the fact that almost all intermediate macroeconomic textbooks are Keynesian in perspective, clearly Keynesian economics is currently at bay. We shall review critically, critiques to Keynesian theory.

ECON 473 Economics of Export-led Development
Fall or spring. 4 credits. Prerequisites: Economics 313, 314, or their equivalent.
This course will examine the phenomenon of export-led development from both the theoretical and empirical points of view. Concentration will be on experiences within the West Pacific Rim.

ECON 481 Economic Effects of Participation and Labor-Managed Systems
Fall or spring. 4 credits. Prerequisites: Economics 381 and 382.
This course applies microeconomic theory to analyzing the performance of firms in which employees either participate in the decision-making process or make all the important decisions. If a specialist in the area is lacking, Prof. Vanek may give the course as a seminar where primarily grad students will discuss topics in the literature selected through consensus of the participants.

ECON 482 Practical Aspects of Business Management of Worker Enterprises
Fall or spring. 4 credits. Prerequisite: should be taken concurrently with or following Economics 382/582, and permission of instructor.
This course is designed to further and deepen undergraduate and graduate students' knowledge of workers' self-management democratic enterprises. It will be based primarily on dialogue and participants' own presentations of their research in relevant areas such as cooperative business law, finance, accounting, or internal work organization. The instructor will act primarily as a coordinator and resource person. Whenever possible an attempt is made to form and incorporate a self-managing cooperative enterprise. Students who have taken all three courses, Economics 381/681, 382/682, and 482, both graduate and undergraduate, are welcome to participate as teacher-student interns. They may receive additional independent study credit for this work.

ECON 483 The Technological and Product Base of Worker Enterprises, with Special Emphasis on Ecology and Solar Energy Applications
Fall or spring. 4 credits. Prerequisite: may be taken concurrently with or following Economics 382/582, and permission of instructor.
This course is designed to deepen undergraduate and graduate students' knowledge of workers' self-management and cooperation, through learning about and construction of simple energy-related technologies, to be produced in workers' enterprises. Size of the class is limited by technical, space, and instruction resources. Some of the technologies may serve as a basis for projects to be undertaken in Economics 482.

ECON 499 Honors Program
Fall and spring. 8 credits.
Consult the Director of Undergraduate Studies for details. Interested students should apply to the program in the spring semester of their junior year.

Graduate Courses and Seminars

ECON 509 Microeconomic Theory I
Fall. 4 credits.
Topics in consumer and producer theory.

ECON 510 Microeconomic Theory II
Spring. 4 credits.
Topics in consumer and producer theory, equilibrium models and their application, externalities and public goods, intertemporal choice, simple dynamic models and resource depletion, choice under uncertainty.

ECON 513 Macroeconomic Theory: Static Income Determination
Fall. 4 credits.

ECON 514 Macroeconomic Theory: Dynamic Models, Growth, and Inflation
Spring. 4 credits.

ECON 516 Applied Price Theory
Spring. 4 credits.
The course emphasizes the applications of the principles of price theory to a variety of problems taken from concrete, practical settings.

ECON 517 Intermediate Mathematical Economics I
Fall. 4 credits.

ECON 518 Intermediate Mathematical Economics II
Spring. 4 credits.

ECON 519 Econometrics I
Fall. 4 credits. Prerequisites: Economics 319–320 or permission of instructor.
This course gives the probabilistic and statistical background for meaningful application of econometric techniques. Topics to be covered are (1) probability theory: probability spaces, random variables, distributions, moments, transformations, conditional distributions, distribution theory and the multivariate normal distribution, convergence concepts, laws of large numbers, central limit theorems, Monte Carlo simulation; (2) statistics: sample statistics, sufficiency, exponential families of distributions. Further topics in statistics will be considered in Economics 520.

ECON 520 Econometrics II
Spring. 4 credits. Prerequisite: Economics 519.
This course is a continuation of Economics 519 (Econometrics I) covering (1) statistics: estimation theory, least squares methods, method of maximum likelihood, generalized method of moments, theory of hypothesis testing, asymptotic test theory, and nonnested hypothesis testing and (2) econometrics: the general linear model, generalized least squares, specification tests, instrumental variables, dynamic regression models, linear simultaneous equation models, nonlinear models, and applications.

ECON 565 Economic Problems of Latin America
Spring. 4 credits.
For description see Economics 365.

ECON 581 Economics of Participation and Worker Management
Spring. 4 credits.
For description see Economics 381.

ECON 582 The Practice and Implementation of Self-Management
Fall. 4 credits.
For description see Economics 382

ECON 599 Readings in Economics
Fall or spring. Variable credit.
Independent study.

ECON 603 Seminar in Peace Science
Fall. 4 credits.
Among topics to be covered at an advanced level are game theory, coalition theory, bargaining and negotiation processes, cooperative procedures, microbehavior models, macrosocial processes, and general systems analysis.

ECON 605 Advanced Social Theory for Peace Scientists
Spring. 4 credits. Prerequisites: Economics 505 and knowledge of microeconomic theory. Study of diverse social science hypotheses and theories as they relate to, and can be synthesized within, multiregional, multinational, and generally multigroup conflict and cooperative frameworks. Particular attention will be given to developments stemming from microeconomics and general systems theory. Dynamic analyses will be emphasized.

ECON 610 Stochastic Economics: Concepts and Techniques
Spring. 4 credits. Prerequisites: Economics 509, 510, 513, 514, 519, and 520.
This course will review a number of techniques that have been useful in developing stochastic models of economic behavior. Among these are (a) discrete-time Markov processes, (b) dynamic programming under uncertainty, and (c) continuous-time diffusion processes. Examples of economic models will be drawn from recent literature on optimal capital accumulation and optimal savings and portfolio selection problems; permanent income hypothesis; dynamic models of price adjustment, etc. Advanced graduate students contemplating work in economic theory and econometric theory will be able to get some exposure to current research.

ECON 611 Advanced Microeconomic Theory
Fall. 4 credits.

ECON 612 Advanced Macroeconomic Theory
Fall. 4 credits.

ECON 617 Mathematical Economics
Spring. 4 credits.

ECON 618 Mathematical Economics
Fall. 4 credits.

ECON 619 Advanced Topics in Econometrics I
Fall. 4 credits. Prerequisites: Economics 519–520 or permission of instructor.
Advanced topics in econometrics, such as asymptotic estimation and test theory, robust estimation, Bayesian inference, advanced topics in time-series analysis, errors in variable and latent variable models, qualitative and limited dependent variables, aggregation, panel data, and duration models.

ECON 620 Advanced Topics in Econometrics II
Spring. 4 credits. Prerequisites: Economics 519–520 or permission of instructor.
For description see Economics 619.

ECON 623 American Economic History
Fall or spring. 4 credits.

ECON 624 American Economic History
Fall or spring. 4 credits.

ECON 626 Methods in Economic History
Fall or spring. 4 credits.

ECON 631 Monetary Theory and Policy
Fall. 4 credits.

ECON 632 Monetary Theory and Policy
Spring. 4 credits.

ECON 635 Public Finance: Resource Allocation and Fiscal Policy
Fall. 4 credits.

ECON 636 Public Finance: Resource Allocation and Fiscal Policy
Spring. 4 credits.

ECON 637 Location Theory and Regional Analysis
Fall. 4 credits. Prerequisites: Economics 509 and 517 and Econometrics.
Economic principles influencing the location of economic activity, its spatial equilibrium structure, and dynamic forces. Topics include spatial pricing policies, price competition, and relocation by firms; residential location patterns; patterns of regional growth and decline; and patterns of urbanization.

ECON 638 Public Finance: Local Government and Urban Structure
Fall or spring. 4 credits.
An integration of urban economics and location theory with local public goods and state and local public finance topics. Both equilibrium models and dynamic analyses are explored.

ECON 641 Seminar in Labor Economics
Fall. 4 credits.

ECON 642 Seminar in Labor Economics
Spring. 4 credits.

ECON 644 The Labor Market and Public Policy: A Comparative View
Fall or spring. 4 credits.

ECON 647 Economics of Evaluation (also Industrial and Labor Relations 647)
Spring. 4 credits.
For description see Industrial and Labor Relations 647.

ECON 648 Issues in Latin America
Fall or spring. 4 credits.

ECON 651 Industrial Organization and Regulation
Fall. 4 credits.

ECON 652 Industrial Organization and Regulation
Spring. 4 credits.

ECON 653 Public Policy Issues for Industrial Organizations
Spring. 4 credits. Prerequisites: Economics 509, 510, and 651.
The course takes an in-depth view of the interaction between the government and business. Methods of business control, including antitrust, price regulation, entry regulation, and safety regulation. Emphasis will be not only on the economic effects on business, but on the economics of selecting and evolving the method of control.

ECON 655 Rivalry and Cooperation
Fall. 4 credits. Prerequisites: Economics Graduate Core or instructor's permission.
In standard models, economic interaction is impersonal. Agents respond to price signals and measure their own welfare not in relative but in absolute terms; and cooperative behavior emerges only when it coincides with narrow self-interest. This course will explore the details of rivalry and cooperation in an effort to synthesize broader views of economic interaction. Topics will include the effect of concerns about relative income on wage rates, consumption, savings, and regulation; the effect of concerns about fairness on prices and wages; the conditions that foster trust and cooperation; and the role of positional competition in the distribution of economic rewards.

ECON 656 Noncooperative Game Theory
Spring. 4 credits. Prerequisites: Economics 509–510 and 519.
This course surveys equilibrium concepts for non-cooperative games. We will cover Nash equilibrium and a variety of equilibrium refinements, including perfect equilibrium, proper equilibrium, sequential equilibrium and more! We will pay attention to important special classes of games, including bargaining games, signalling games, and games of incomplete information. Most of our analysis will be from the strict decision-theoretic point of view, but we will also survey some models of bounded rationality in games, including games played by automata.

ECON 657 Economics of Imperfect Information
Spring. 4 credits. Prerequisites: Economics 509–510 and 519.
The purpose of this course is to consider some major topics in the economics of uncertain information. Although the precise topics considered will vary from year to year, subjects such as markets with asymmetric information, signalling theory, sequential choice theory, and record theory will be discussed.

ECON 661 International Economics: Trade Theory and Policy
Fall. 4 credits.
This course surveys the sources of comparative advantage. It analyzes simple general equilibrium models to illustrate the direction, volume, and welfare effects of trade. Topics in game theory and econometrics as applied to international economics may be covered.

ECON 662 International Economics: International Finance and Open Economy Macroeconomics
Spring. 4 credits.
This course surveys the determination of exchange rates and theories of balance of payment adjustments. It explores open economy macroeconomics by analyzing models of monetary economies. Topics in monetary economics and econometrics as applied to international economics will be covered.

ECON 664 International Economics: Balance of Payments and International Finance
Fall or spring. 4 credits.

ECON 670 Economic Demography and Development
Fall or spring. 4 credits.

ECON 671 Economics of Development
Spring. 4 credits.

ECON 672 Economics of Development
Fall. 4 credits. Prerequisites: first-year graduate economic theory and econometrics.
Analytical approaches to the economic problems of developing nations. Topics to be covered include: some old and new directions in development economics thinking, the welfare economics of poverty and inequality, empirical evidence on who benefits from economic development, labor market models, project analysis with application to the economics of education, and development policy.

ECON 673 Economic Development
Fall or spring. 4 credits. Prerequisites: Economics 509 and 520.
The course is concerned with theoretical and

applied works that seek to explain economic development, or lack thereof, in countries at low-income levels. Specific topics vary each semester.

ECON 674 Economic Systems
Spring. 4 credits.

ECON 675 Comparative Economic Organization and Institutions
Fall. 4 credits. Prerequisites: Economics 314 and 351–352 or equivalent.
This course addresses problems of coordination, management, finance, and organizational structure in firms and, to some extent, economies. It covers topics such as coordination mechanisms for production activity, problems arising in the control of subordinate agents' behavior, decision making within firms, internal firm organization, financial institutions and loan contracts, and the market for firm control. Course material draws from literature on mechanism design and from the fields of industrial organization, finance, and comparative systems.

ECON 678 Economic Growth in Southeast Asia
Fall or spring. 4 credits.

ECON 681 Economics of Participation and Self-Management
Fall. 4 credits. Prerequisites: Economics 101–102, or permission of instructor.
For description see Economics 381. Economics 681 is given on a more advanced graduate level.

ECON 682 Seminar on Economics of Participation and Labor-managed Systems
Fall. 4 credits.

ECON 684 Seminars in Advanced Economics
Fall and spring. 4 credits.

ENGLISH

W. Wetherbee, chair; D. Fried, director of undergraduate studies (255–3492); T. Murray, graduate faculty representative (255–6800); J. Bishop, director of honors program; B. B. Adams, A. R. Ammons, J. P. Bishop, J. F. Blackall, A. Boehm, F. V. Bogel, L. Bogel, Laura Brown, Lois Brown, C. Chase, B. Correll, J. Culler, S. Davis, D. Eddy, L. Fakundiny, R. T. Farrell, A. Galloway, R. Gilbert, K. Gottschalk, L. Herrin, T. D. Hill, M. Hite, M. Jacobus, P. Janowitz, B. Jeyifo, C. V. Kaske, M. Koch, C. S. Levy, A. Lurie, D. E. McCall, K. A. McClane, M. McCoy, H. S. McMillin, P. Marcus, D. Mermin, S. P. Mohanty, R. Morgan, H. Mullen, T. Murray, R. Parker, J. Porte, E. Rosenberg, N. Saccamano, S. Samuels, P. Sawyer, D. R. Schwarz, M. Seltzer, H. E. Shaw, S. Siegel, G. Teskey, S. Vaughn, S. Wong. Emeriti: M. H. Abrams, A. Caputi, S. Elledge, R. Elias, E. G. Fogel, J. R. McConkey, S. Parrish, M. A. Radzinowicz, S. C. Strout

The Department of English offers a wide range of courses in English, American, and Anglophone literature as well as in creative writing, expository writing, and film. Literature courses focus variously on the close reading of texts, the study of particular authors and genres, questions of critical theory and method, and the relationship of literary works to their historical periods and to other disciplines. The department seeks not only to foster analytical reading and lucid writing but also, through the study of literary texts, to teach students to think about the nature of language, and to be alert to the rigors and pleasures of that ordinary and peculiar activity, reading.

Students who major in English develop their own programs of study in consultation with their advisers. Some focus on a particular historical period or literary genre; others combine sustained work in creative writing with the study of literature. Others pursue special interests in such areas as women's literature, Afro-American literature, literature and the visual arts, or critical theory.

There are also many ways for students informally to supplement their course work in English, by attending the frequent lectures and poetry readings sponsored by the department, or by writing for campus literary magazines.

The Major

Any student considering a major in English should meet with the department's director of undergraduate studies to discuss the major and be assigned a major adviser. Copies of a brochure containing suggestions for English majors and prospective English majors are available in the department office, 250 Goldwin Smith Hall.

The Department of English recommends that its students ready themselves for the major by taking at least one preparatory course. Freshmen interested in majoring in English are encouraged to take one of the following freshman seminars: The Reading of Fiction (English 270), The Reading of Poetry (English 271), or Introduction to Drama (English 272). First-term freshmen with a score of 700 or above on the CEEB College Placement Tests in English composition or literature or 4 or 5 on the CEEB Advanced Placement Examination in English may enroll in English 270, 271, 272 as space permits (all students who have taken one freshman seminar are permitted to enroll in these courses as space permits).

English 201 and 202, a survey of major British writers, though not required for the major, are strongly recommended for majors and prospective majors, since they afford an overview of the history of English literature, providing an introduction to periods, authors, and genres that allows students to make a more informed choice of advanced courses.

In addition, The American Literary Tradition (English 275) and the Essay in English (English 295) are especially suitable in preparation for the major.

Requirements

Each English major must complete with passing letter grades at least 36 credits in courses approved for the major. Students may count up to four courses for the major from the category entitled "200–level Courses Approved for the Major." All English courses numbered 300 or above count toward the major. Of the 36 credits required for the major, 12 (three courses) must be taken in literature before 1800. (Courses taken for the English major may also be used to satisfy the arts college humanities distribution requirement or, in the case of creative writing courses, the expressive arts distribution requirement.)

A major, then, might normally consist of three or four courses at the 200 level, three or four at the 300 level, and a couple of 400-level seminars. A student's selection of courses will ideally display some historical breadth (as is reflected in the requirement of three courses in literature before 1800) and training in the reading of several kinds of literature (such as drama, poetry, and fiction). In their final semesters, English majors should be ready for more advanced seminars in a more focused field of interest.

Foreign Language

English majors also are required to complete six credits of foreign language study (preferably in literature) in courses for which qualification is a prerequisite. Advanced placement credit does not fulfill this requirement, nor does the study of foreign literature in translation. Majors are urged to complete this requirement by the end of their sophomore year, and those who enter Cornell without sufficient preparation should begin their language study at once.

With the permission of their advisers, students may count toward the English major a maximum of 12 credits in literature or creative writing courses at the 300 level or above given by such departments and programs as Comparative Literature, Theatre Arts, Romance Studies, the Africana Studies and Research Center, and the Society for the Humanities. Double majors may count toward these 12 credits any courses, 300 level or above, taken in their other major if such courses are approved by their English department adviser as relevant to the study of literature.

Honors

Prospective candidates for the degree of Bachelor of Arts with honors in English should read the handout "English Department Honors Program," available in the English office. These students should discuss their qualifications with the chair of the Honors Committee during the spring term of their sophomore year, when they will be admitted provisionally to the program. During their junior year, honors candidates must take one honors seminar (English 491 or 492), which will reflect a dominant area of interest, address methods of scholarly research, and require the composition of a long end-of-term essay. Honors students are strongly encouraged to take an additional 400–level course in the field in which they plan to concentrate. On the basis of their performance, students will be officially admitted to the program at the end of the junior year. Seniors in honors enroll in a year-long tutorial (English 493 and 494) in which they work closely with a faculty member especially qualified to supervise the topic of the candidate's choosing; the year's work culminates in the writing of a scholarly honors thesis. (All seniors in the program are expected to attend informal sessions in which they discuss their work-in-progress.) More information about the program may be found in the department's brochure for honors candidates.

Courses for Nonmajors

For students not majoring in English, the department makes available a variety of courses at all levels. Some courses at the 200 level are open to qualified freshmen, and all

of them are open to sophomores. Courses at the 300 level are open to juniors and seniors and to underclass students with permission of the instructor. The suitability of courses at the 400 level for nonmajors will vary from topic to topic, and permission of the instructor is required.

Freshman Writing Seminars

As part of the Freshman Writing Program, the Department of English offers many one-semester courses concerned with various forms of writing (narrative, biographical, expository), with the study of specific areas in English and American literature, and with the relation of literature to culture. Students may elect any two of these courses during their first year to satisfy the Freshman Seminar requirement. Descriptions of Freshman Writing Program offerings may be found in the Freshman Writing Program listings, available from college registrars in August for the fall term and in November for the spring term.

Especially well-qualified students who are considering a major in English are encouraged to enroll in English 270, 271, or 272.

Students who have scored 4 or 5 on the Princeton exam or 700 or better on the English Composition or CEEB test are eligible to enroll in the fall semester (space permitting) in any one of these courses. English 270, 271, and 272 will be open to all freshmen in the spring semester who have satisfactorily completed one freshman seminar. Registration is handled by the Freshman Writing Program during freshman registration.

ENGL 270 The Reading of Fiction
Fall, spring, each summer. 3 credits. Each section limited to 17 students. Freshman Seminar. Recommended for prospective majors in English. Forms of modern fiction, with emphasis on the short story and novella. Critical study of works by English, American, and Continental writers from 1880 to the present.

ENGL 271 The Reading of Poetry
Fall, spring. 3 credits. Each section limited to 17 students. Freshman Seminar. Recommended for prospective majors in English. Designed to sharpen the student's ability to understand and respond to poetry, through readings in the major periods, modes, and genres of poetry written in English.

ENGL 272 Introduction to Drama
Fall, spring. 3 credits. Each section limited to 17 students. Freshman Seminar. Recommended for prospective majors in English. Selected works by such playwrights as Sophocles, Shakespeare, Ibsen, and Brecht introduce the chief idioms and styles of drama. The course work may include a special project related to the plays being produced by the Department of Theatre Arts.

Courses Primarily for Nonmajors

ENGL 205–[206] Readings in English and American Literature #
205, fall; [206, not offered 1992–93]. 3 credits each term. Open to all undergraduates. English 205 is *not* a prerequisite for 206.
205: Fall, M W F 10:10–11:00. R. Farrell.
An introduction to some of the major texts from the beginning of the literature through the eighteenth century. The first weeks will be devoted to *Beowulf* and two selections from the Chaucer's *Canterbury Tales* as samples of early achievements in English literature. Readings from other authors include works by Shakespeare, Jonson, Marlowe, Donne, Pope, Swift, and Johnson.

[ENGL 210 Medieval Romance: The Voyage to the Otherworld
3 credits. Not offered 1992–93.]

ENGL 227 Shakespeare #
Fall, spring, summer. 3 credits. Each section limited to 25 students.
Fall: M W 7:30–8:45 p.m., S. Davis; spring: to be announced. B. Adams.
A critical study of representative plays from the principal periods of Shakespeare's career.

ENGL 288–289 Expository Writing
288, fall; 289, spring. 3 credits each term. Each section limited to 16 students. Prerequisites: Registrants must have completed the freshman writing requirements of their individual colleges before they may enroll in this course.
To be announced. S. Davis and staff.
English 288–89 offers guidance and an audience for students who wish to gain skill in expository writing. Each section provides a context for writing defined by a form or use of exposition, a disciplinary area, a practice, or a topic intimately related to the written medium. Course members will read regularly in relevant published material and do a substantial amount of new writing of their own each week, while reviewing and responding to each other's work. Since these seminar-sized courses depend on members' full participation, regular attendance and submission of written work are required. Students and instructors will confer individually throughout the term.

Fall 1992:

Section 1.—Writing about the Social World—K. Hjortshoj

Section 2.—Writing in the Humanities—S. Davis

Section 3.—Issues and Audiences—B. LeGendre

Section 4.—The Reflective Essay—A. Boehm

Section 5.—The Reflective Essay—A. Boehm

Section 6.—Criticism and the Popular Arts—B. Appelbaum

Section 7.—Journey and Displacement—J. Landretti

Section 8.—The Essay: Personal to Public—P. Marcus

Section 9.—Rights, Politics, and the Constitution—L. Laufenberg

Section 10.—The Language of Disease—P. Currah

Spring 1993: To be annoucned.

See English Department *Guide to Course Scheduling* for full fall and spring section descriptions.

Writing Courses

Students generally begin their work in Creative Writing with English 280 or 281. These two introductory courses do not count toward major credit. Creative writing courses at the 300 level or above are approved for the major.

ENGL 280–281 Creative Writing
Fall, spring, summer, and winter session. 3 credits. Prerequisites: completion of the Freshman Seminar requirement. Limited to 18 students each section. Please note the following registration procedures for Creative Writing 280–281: (Fall and Spring) enrollment is by ballot only. Students interested in Creative Writing must come to the Grand Course Exchange to fill out a ballot. Not open to Freshmen. No pre-registration for 280–281 will be accepted. Further details will be available in registration packets and at the Grand Course Exchange.

An introductory course in the theory and practice of writing narrative prose, poetry, and allied forms. English 280 is not a prerequisite for English 281.

ENGL 382–383 Narrative Writing
See complete course description in section headed Courses for Sophomores, Juniors, and Seniors.

ENGL 384–385 Verse Writing
See complete course description in section headed Courses for Sophomores, Juniors, and Seniors.

ENGL 480–481 Seminar in Writing
See complete course description in section headed Courses for Advanced Undergraduates.

Expository Writing

ENGL 381 Reading as Writing
See complete course description in section headed Courses for Sophomores, Juniors, and Seniors.

ENGL 386 Philosophic Fictions
See complete course description in section headed Courses for Sophomores, Juniors, and Seniors.

[ENGL 387 Autobiography: Theory and Practice
4 credits. Not offered 1992–93.]

ENGL 388–389 The Art of the Essay
See complete course description in section headed Courses for Sophomores, Juniors, and Seniors.

200–Level Courses Approved for the Major

Students may take up to four of the following 200–level courses for credit toward the English major. Although courses numbered in the 200s are primarily for sophomores, some of them are open to qualified freshmen and to upperclass students.

ENGL 201–202 The English Literary Tradition #
Fall and spring. 4 credits. Open to undergraduates who have completed the freshman writing requirement. English 201 is not a prerequisite for 202.
201: Fall. M W F 12:20–1:10.
W. Wetherbee.
A survey of English literature from its beginnings through Chaucer, Spenser, Shakespeare, and Milton.
202: Spring. To be announced.
P. Sawyer.
A survey of English literature from the Restoration through the twentieth century, including works by Congreve, Dryden, Swift, Pope, Mary Wortley Montague; the Romantic and Victorian poets; Wilde, Yeats, and T. S. Eliot. Lectures and discussion sections.

[ENGL 204 Close Reading: An Intensive Introduction
4 credits. Not offered 1992–93.]

ENGL 207 Introduction to Twentieth-Century Poetry (also Comparative Literature 207)
Spring. 3 credits.
To be announced. J. Monroe and R. Gilbert.
Poetry written in the twentieth century is both challenging and exhilarating in its freedom, innovation, and diversity. Not a survey, this course will sample the vast array of poetic modes and forms employed over the past 91 years, crossing national and linguistic boundaries to give a sense of what poetry has meant and done for people in this century. Our focus in the course will be on the poems themselves—how they feel, sound, look, mean, and work—and on the varying contexts in which they may be read. These contexts include: audiences for poetry; the life and career of the poet; important poetic movements (Imagism, Surrealism, "Language" poetry); verse forms ranging from the strictly patterned to the seemingly random; the poetry industry (or "Po Biz"); poetry and social movements (feminism, multiculturalism); poetry and the "self." Attention will also be paid to the craft of poetry-writing through exercises as well as lectures by local poets. Poems not in English will be read in translation. No previous study of poetry required.

[ENGL 247 Major Nineteenth-Century Women Novelists (also Women's Studies 248) #
4 credits. Not offered 1992–93.]

[ENGL 251 Twentieth-Century Women Novelists (also Women's Studies 251)
4 credits. Not offered 1992–93.]

[ENGL 253 The Modern Novel
Fall. 4 credits. Not offered 1992–93.]

ENGL 255 African Literature @
Fall. 4 credits.
T R 10:10–11:25. B. Jeyifo.
An introduction to major African writers and literary traditions. Authors studied may include Achebe, Soyinka, Clark, Armah, Ngugi, and Amercheta.

ENGL 262 Asian American Literature (also Asian American Studies 262)
Spring. 3 credits.
To be announced. S. Wong.
This course will introduce students to the wide range of writing by Asian Americans and to some critical issues concerning the production and the reception of Asian American texts. In reading through selected works of prose, poetry, and drama, we will be asking questions about the historical formation of Asian American identities and the problems of defining an Asian American literary tradition.

ENGL 263 Studies in Film Analysis
Fall 1992, Special Topic: **Interpreting Hitchcock**. 4 credits. Enrollment limited to 20 students. Preference given to English majors.
T R 11:40–12:55. L. Bogel.
Through detailed analysis of at least ten of Hitchcock's major films—from British silents such as *The Lodger* and the British talkies of the 30s *(The Thirty-Nine Steps)* to the early 40s work in Hollywood *(Spellbound, Notorious)*, and major American films of his late period (*Rear Window, The Birds*)—we will consider Hitchcock as a major technical and stylistic innovator in the history of cinema. As texts for psychoanalytic and feminist approaches to study, his films invite questions about film language, the ethics of spectatorship, and the nature of desire and sexuality. Frequent short essays and viewing exercises encourage students to engage through their writing the course's critical concerns. **Students must be free to attend regular evening screenings and video showings of the films once or twice a week. Lab fee.**

[ENGL 264 Ethnic Literature: Bridges and Boundaries
Fall. 4 credits. Not offered 1992–93.]

ENGL 265 The Afro-American Folk Tradition in American Literature
Fall. 3 credits.
M W F 11:15–12:05. H. Mullen.
Writings of Chesnutt, Dunbar, Hurston, Hughes, Ellison, Reed, Baraka, Morrison, Bambara, and others provide a focus for examining the relationship between literary texts and oral traditions of song, poetry, narrative, and verbal contest.

ENGL 268 The Culture of the 1960s
Spring. 4 credits.
To be announced. P. Sawyer.
The 1960s survive today as a quasi-mythical period and as an ongoing debate. Was it a time of dangerous experimentation with drugs, sex, and alternative "lifestyles" on the part of a pampered generation that gradually learned to straighten up and join the mainstream? Or was it a time of revolutionary hopefulness, when the Civil Rights movement and the Vietnam War stimulated a passionate critique of the racist, sexist, and imperialist structures of American society? In addressing these questions through a reading of texts from that turbulent decade, we will be attentive to ways the media have converted the 1960s into nostalgia and titillation. Readings will include *Catch-22, The Autobiography of Malcom X, The Electric Kool-Aid Acid Test*, and *Marat/Sade*, as well as works by Sylvia Plath, Betty Friedan, Abby Hoffman and others; the music of Dylan and Hendrix; and four films.

ENGL 275 The American Literary Tradition
Fall, spring. 3 credits. Recommended for prospective majors in American Studies. This is *not* a Freshman Seminar.
Fall: T R 10:10–11:25. S. Samuels. Spring: to be announced. J. Bishop.
A sequence of prominent texts from the early nineteenth through the late twentieth century, chosen to exhibit what has been accomplished in fiction, long or short, autobiography, and poetry by some American writers, male and female, black and white. A representative syllabus might include such names as Hawthorne, Whitman, Douglass, Melville, Alcott, James, Hemingway, Salinger, and Morrison.

ENGL 277 Folklore and Literature
Fall. 4 credits.
M W F 2:30–3:20. A. Lurie.
An introduction to British and American folklore: folk speech and slang, rhymes, riddles, jokes, ballads, songs, legends, fairy tales, ghost stories, and customs and festivals; plus reading of British and American poetry and fiction that uses these forms and themes. Students will also learn how to collect and analyze contemporary folklore.

ENGL 295 The Essay in English #
Spring. 4 credits. Prerequisite: completion of freshman seminar requirement.
To be announced. L. Fakundiny.
What is an essay and what is it for? How does it work as prose discourse, as a text of the self? Impelled by such generic questions and others raised by Montaigne's French *Essais (1588)*, this course explores the invention of the essay in English during the sixteenth and seventeenth centuries and its flowering in the periodicals and magazines of the eighteenth and nineteenth centuries. Readings include selections from the work of Bacon, Cornwallis, Donne, Earle, Cowley, Temple, Swift, Addison, Steele, Johnson, Franklin, Goldsmith, Lamb, Hazlitt, Irving, and DeQuincey. Essays by earlier writers are matched rhetorically and/or thematically with readings from more recent practitioners of the genre including Dubois, Woolf, Orwell, Welty, Baldwin, Selzer, Ozick, Achebe, Didion, S.Naipaul, Dillard, Sanders, and others. This is a course for students interested in reading essays and in thinking about how this nonfiction prose genre developed and how it works. No special background in literary history is assumed.

Courses for Sophomores, Juniors, and Seniors

Courses at the 300 level are open to juniors and seniors and to others with the permission of the instructor.

ENGL 302 Literature and Theory (also English 702 and Comparative Literature 702)
Fall. 4 credits.
M W F 11:15–12:05. J. Culler.
Study of issues in contemporary theoretical debates, with particular attention to structuralism, deconstruction, psychoanalysis, and feminism. Readings by Barthes, Derrida, Foucault, B. Johnson, J. Rose, and others. No previous knowledge of literary theory is assumed.

[ENGL 308 The Icelandic Family Saga
4 credits. Not offered 1992–93.]

ENGL 310 Old English Literature in Translation #
Fall. 4 credits.
M W F 12:20–1:10. T. Hill.
Cultural backgrounds, reading, and critical analysis of Anglo-Saxon poetry in translation, pagan and Christian epic, elegy, heroic legend, and other forms. Attention will be given to the relations of this literature to that of later periods.

ENGL 311 An Introduction to Early Medieval Archaeology and Culture (also Archaeology 311, English 603) #
Spring. 4 credits.
To be announced. R. Farrell.
This course will cover the period 400 to 1100 with England and Ireland the centers of interest. Topics include the transition from late classical to medieval, the complex cultural relations between England and Ireland, the continent and the northern world. The relationships between documentary and artifactual evidence will be closely examined. The major written texts will be Tain, *Beowulf*, and Bede's ecclesiastical history. Students will be urged to follow their interests in oral reports and brief research papers. Those taking the course for graduate credit will be expected to engage in a significant research effort. Permission of the instructor required for registration.

ENGL 319 Chaucer #
Fall. 4 credits.
M W F 11:15–12:05. R. Farrell.
The course will center on a close reading of the major stories from the *Canterbury Tales*, *Troilus and Criseyde*, and some of the minor works. Students will be given ample opportunity to learn Chaucer's language, so that all dimensions of the poems will be available to them. Prior knowledge of Middle English is neither expected nor required; course participants will be encouraged to follow up their own interests in class reports and papers.

[ENGL 320 The Sixteenth Century—Tudor Culture #
4 credits. Not offered 1992–93.]

[ENGL 321 Spenser and Malory #
4 credits. Not offered 1992–93.]

ENGL 322 The Seventeenth Century #
Fall. 4 credits.
T R 10:10–11:25. B. Correll.
Representative English drama, poetry, and prose from the Jacobean period through the English Revolution. Readings of both major figures (Shakespeare, Donne, Jonson, Marvell, Milton) and minor ones (prophets, radicals, royalists) in the context of historical change and challenges.

[ENGL 325 The Culture of the Later Renaissance (also Comparative Literature 362, and History 364) #
4 credits. Not offered 1992–93.]

ENGL 327 Shakespeare #
Spring. 4 credits.
M W F 2:30–3:20. G. Teskey.
A survey of Shakespeare's major plays, with emphasis on his dramatic art.

[ENGL 328 Medieval and Renaissance Drama (also Theatre Arts 332) #
4 credits. Not offered 1992–93.]

ENGL 329 Milton #
Spring. 4 credits.
To be announced. G. Teskey.
An introduction to the poetry and thought of John Milton.

ENGL 330 Restoration and Eighteenth-Century Literature #
Fall. 4 credits.
T R 10:10–11:25. F. Bogel.
Close reading of texts in a variety of genres (poetry, fiction, drama, autobiography) will be guided by such topics as the nature of satire, irony, and mock-forms; the languages of the ridiculous and the sublime; the authority and fallibility of human knowledge; connections among melancholy, madness, and imagination. Works by such writers as Rochester, Dryden, Swift, Gay, Defoe, Johnson, Boswell, Sterne, and Cowper.

ENGL 333 The Eighteenth-Century English Novel #
Spring. 4 credits.
To be announced. N. Saccamano.
The rise of the English novel. We will place the emergence of the novel as a dominant literary genre in the context of other intellectual and cultural developments in eighteenth-century England and will discuss what the novel's changing form can tell us about the nature of fiction and the problems of representation. Novels by Behn, Defoe, Richardson, Fielding, Sterne, and Austen.

ENGL 336 American Drama and Theatre (also Theatre Arts 336)
Spring. 4 credits.
To be announced. J. E. Gainor.
A survey of twentieth-century American theatre and representative American plays.

ENGL 340 The English Romantic Period #
Fall. 4 credits.
T R 10:10–11:25. C. Chase.
Readings in the major poets—Blake, Wordsworth, Coleridge, Shelley, Bryon, and Keats—along with a few related essays and autobiographical texts. We will examine how Romanticism is linked with reflections upon time and history.

[ENGL 345 The Victorian Period #
4 credits. Not offered 1992–93.]

[ENGL 347 Reading Freud: Race, Gender, and Psychoanalysis (also Comparative Literature 347, German Studies 347, and Psychology 389)
3 credits. Not offered 1992–93.]

[ENGL 348 The Female Literary Tradition: Wollstonecraft to Woolf (also Women's Studies 348) #
4 credits. Not offered 1992–93.]

[ENGL 350 The Early Twentieth Century (to 1930)
4 credits. Not offered 1992–93.]

[ENGL 354 The British Modernist Novel
4 credits. Not offered 1992–93.]

[ENGL 356 Postmodernist Fiction
4 credits. Not offered 1992–93.]

[ENGL 358 Twentieth-Century Experimental Fiction by Women
4 credits. Not offered 1992–93.]

ENGL 360 The Esthetes and Their Critics #
Spring. 4 credits. Prerequisites: English 202 or the equivalent and consent of the instructor. Limited to 25 students.
To be arranged. S. Siegel.
Readings in the Pre-Raphaelites and "esthetes"—and the criticism their views and their artworks inspired. Against this background, the course will consider turning points in late nineteenth- and early twentieth-century social thought. Texts will include Arnold, Ruskin, Morris, Pater, Swinburne, the Rosettis, Wilde, Beardsley, Bergson, and Freud.

ENGL 361 Early American Literature
Fall. 4 credits.
T R 1:25–2:40. S. Samuels.
American writing from the 1630s to the 1830s, including prose and poetry of the Puritans, Edwards, Franklin, Crevecoeur, Brockden Brown, Irving, Bryant, and Cooper and the early work of Poe, Hawthorne, and Emerson. This course may be used to fulfill the major requirement of courses in literature before 1800.

ENGL 362 The American Renaissance #
Spring. 4 credits.
To be announced. J. Bishop.
The major literary achievements of Emerson, Thoreau, Hawthorne, Melville, Whitman, and Dickinson.

ENGL 363 The Age of Realism and Naturalism
Spring. 4 credits.
To be announced. M. Seltzer.
The literary expression of new attitudes toward American society and culture between the Civil War and the First World War. We will read a sequence of representative instances, chiefly fictional or historical, selected from the work of such authors as Whitman, Twain, Howells, Cable, H. James, W. James, Crane, Wharton, H. Adams, S. O. Jewett, Dreiser, and Cather.

[ENGL 364 American Literature between the Wars
4 credits. Not offered 1992–93.]

ENGL 365 American Literature since 1945
Fall. 4 credits.
M W F 2:30–3:20. L. Herrin.
This course will alternate with English 364, which surveys American literature between the two world wars. Most of the writers we will study still live and write and change. Consequently, the verdict will not be in. Fiction writers will most likely include Bellow, Nabokov, Barth, Ellison, Welty, John Hawkes, Toni Morrison, and Louise Erdrich. From an anthology of contemporary American poetry we will read Robert Lowell, A. R. Ammons, Sylvia Plath, Gary Snyder, Theodore Roethke, and others. If we have time we will look at the personally engaged journalism of Norman Mailer and Joan Didion. Writers will be chosen who will give us as keen and varied and provocative a view of ourselves as possible.

[ENGL 366 The Nineteenth-Century American Novel #
4 credits. Not offered 1992–93.]

ENGL 367 The Modern American Novel (up to WW II)
Spring. 4 credits.
To be announced. D. McCall.
A reading of some modern American writers of the first half of the twentieth century. Works by Hemingway, Fitzgerald, Faulkner. Lectures with some opportunity for discussion. Emphasis will be on the individual works in their historical contexts.

[ENGL 368 The Contemporary American Novel
4 credits. Not offered 1992–93.]

ENGL 370 The Nineteenth-Century English Novel #
Spring. 4 credits.
To be announced. P. Sawyer.
A study of representative works by major English novelists from Austen to Eliot. The course will view these works from a number of different perspectives, focusing on the individual texts as well as on the question of what is involved in reading them (or any other novels). By the end of the course the student should have learned something about nineteenth-century fiction but also about ways of interpreting fiction in general. The reading list will incude Austen, *Emma*; Bronte, *Wuthering Heights*; Dickens, *Little Dorrit*; Eliot, *Middlemarch*; and Hardy, *Tess of the D'Urbervilles*.

[ENGL 371 American Poetry from Emerson to Stevens
4 credits. Not offered 1992–93.]

[ENGL 372 English Drama #
4 credits. Not offered 1992–93.]

ENGL 374 Nineteenth-Century American Women Writers (also Women's Studies 374) #
Fall. 4 credits.
T R 11:40–12:55. Lois Brown.

In this cross-cultural examination of nineteenth-century American women writers, we will contrast a variety of nineteenth-century works of fiction, political/feminist manifestos, and slave narratives. We will investigate the ways in which these writers used their texts to construct culturally valuable and authentic selves. We will also consider tensions between "sentimental" idealism and political pragmatism, passionless femininity and expressed sexuality, restrictive domesticity and dangerous but vital autonomy. Readings will include Louisa May Alcott's *Behind a Mask*, Anna Julia Cooper's *A Voice from the South*, Frances Harper's *Iola LeRoy*, Harriet Beecher Stowe's *The Minister's Wooing*, and Harriet Wilson's *Our Nig*.

[ENGL 376 Afro-American Literature
4 credits. Not offered 1992–93.]

ENGL 382–383 Narrative Writing
Fall, 382; spring, 383. 4 credits each term. Each section limited to 15 students. Students are encouraged to take English 280–281 previously. Prerequisite: permission of instructor, normally on the basis of a manuscript.

382 Fall: M W 11:15–12:05, D. McCall; T R 2:55–3:45, E. Rosenberg; M W 12:20–1:10, A. Lurie; plus conferences to be arranged.
383 Spring: to be announced, L. Herrin; to be announced, M. Koch.

The writing of fiction; study of models; analysis of students' work.

ENGL 384–385 Verse Writing
Fall or summer, 384; spring, 385. 4 credits each term. Each section limited to 15 students. Prerequisites: English 280 and 281 and permission of instructor.

384 Fall: M 12:20–2:15, A. Ammons; T 2:30–4:25, P. Janowitz; 385 Spring; to be announced, K. McClane.

The writing of poetry; study of models; analysis of students' poems; personal conferences.

ENGL 386 Philosophic Fictions
Permission of the instructor. Students wishing to enter the course should furnish the instructor with a writing sample before the start of the term.
Spring. 4 credits.
To be announced. S. Davis.
"Fictions"—of voice, audience, plot, point of view, and figurative language—abound in all good expository writing; they stand out in works that deliberately test and play with ideas: dialogues, satires, parodies, aphorisms, philosophic tales, and "thought-experiments." Students in this course will read such works, write critically about them, and experiment with writing in similar forms. The "fictions" read and written in this course are not conventional realistic narratives; they are the vehicles and animating resources of writers who want to argue flexibly, provoke thought, ridicule vice or folly, play games, or involve readers in pleasingly or disturbingly insoluble problems. Readings may include such works as Plato's *Gorgias*, Swift's "Modest Proposal," Voltaire's *Candide*, Diderot's *Rameau's Nephew*, Kierkegaard's "Diary of a Seducer," Carroll's *Alice* books, short fictions by Calvino or Borges and Octavia Butler, selections from Wittgenstein's *Philosophical Investigations*, and Stoppard's *Dogg's Hamlet, Caboot's Macbeth*.

ENGL 388–389 The Art of the Essay
Fall, 388; Spring, 389. 4 credits each term. Limited to 15 students. Prerequisite: permission of the instructor, on the basis of one or more pieces of recent writing (prose) submitted **before** the beginning of term, preferably at preregistration time.
Fall. T R 2:55–4:10. L. Fakundiny. Spring. To be announced. C. Levy.
For both English majors and nonmajors who have done distinguished work in freshman seminars and in such courses as English 280–281, 288–289, 286 and who desire intensive practice in writing personal essays. The course assumes a high degree of self-motivation, a capacity for independent work, and a critical interest in the work of other writers; it aims for a portfolio of nonfiction prose that is conceptually rich and stylistically polished.

Interested students should submit one or more samples of recent writings (prose) to the instructor *before* the beginning of term, preferably at preregistration.

Spring. To be announced. C. Levy.

Interested students should submit a writing sample to Professor Levy before the beginning of the term, preferably during course scheduling.

For both English majors and nonmajors who have done well in freshman writing seminars, or in such courses as English 288–89 or 286, and who desire intensive practice in writing essays.

Particular, but not exclusive, emphasis on expository techniques of analysis and persuasion.

Courses for Advanced Undergraduates

Enrollment in courses at the 400 level is generally limited by prerequisite or permission of the instructor.

ENGL 403 The Formation of Canonical Objects (also Society for the Humanities 409) #
Fall. 4 credits.
W 10:10–12:05. G. Teskey.
An investigation of categories within which made things are given cultural value. Readings from Homer, Spenser, Joyce, Nietzsche, Heidegger, and Benjamin.

ENGL 404 History into Fiction: Nazis and the Literary Imagination (also Comparative Literature 404, Near Eastern Studies 404, and Program of Jewish Studies 414)
Fall. 4 credits.
T R 11:40–12:55. E. Rosenberg.
The twelve years of Hitler's rule remain the most critical, "longest" years of the century. We shall read some seven or eight texts by Anglophone and Continental novelists (and a few playwrights and poets) that explore salient features of the regime: Hitler's rise to power (e.g., Mann's "Mario and the Magician," Brecht's *Arturo Ui*, Hughes's *Fox in the Attic*); civilian life in Nazi Germany (e.g., Isherwood's *Berlin Stories*, Grass's *Tin Drum*); World War II (Boell's fiction). The persecution of European Jews (Sarte's "Childhood of a Leader," Brecht's "Jewish Wife," selections from Julian Barnes's novel, *History of the World*); the Occupation (Camus's *The Plague*, Nabokov's "That in Aleppo"); the Holocaust (e.g., Weiss's *Investigation*, Borowski's *This Way for the Gas*, Spiegelman's *Maus I* or *Maus II*); lyrics by Celan, Nelly Sachs, Anthony Hecht. Brief ancillary selections by historians and memorialists (Arendt, Fest, Primo Levi, Bettelheim, Anne Frank); uses of documentary materials. Two short papers; no exam. Limited enrollment.

[ENGL 405 The Politics of Contemporary Criticism
4 credits. Not offered 1992–93.]

[ENGL 406 Archaeology of Early Christian England and Ireland
4 credits. Not offered 1992–93.]

ENGL 407 Constructions of African American Heroism
Spring. 4 credits.
To be announced. Lois Brown.
In this course we will explore constructions of African American heroism in nineteenth- and twentieth-century American literature. Throughout the term we will attempt to clarify our concept of heroism in terms of gender, race, class, and history. We shall explore the requirements and costs of heroic behavior within particular African American communities, as well as within the larger American society. We will contemplate the evolution of images of heroism, viability of individual efforts, and the gains and losses resulting from heroic performance. We will also examine the extent to which African American heroic development is encouraged or stymied by particular literary forms. Primary materials will include David Bradley's *The Chaneysville Incident*, Octavia Butler's *Wild Seed*, Olaudah Equiano's *Narrative of the Life*, Anne Moody's *Coming of Age in Mississippi*, and William Styron's *The Confessions of Nat Turner*.

ENGL 411 Introduction to Old English (also English 611)
Fall. 4 credits.
M W F 10:10–11:00. A. Galloway.
A reason for anyone to consider a course in the earliest extant English literature and language is to expand one's grasp of the history of the English language and the early development of English literary and cultural history. This course will seek to provide the basic tools to do this, by introducing a body of literature that is peculiarly beautiful and thoroughly engaged in its culture's ideals and problems.

ENGL 412 Beowulf (also English 612) #
Spring. 4 credits.
To be announced. T. Hill.
A close reading of *Beowulf*. Attention will be given to relevant linguistic and literary problems.

ENGL 413 Middle English (also English 614) #
Spring. 4 credits.
To be announced. A. Galloway.
This course surveys the literature of later medieval England, beginning with the cultural, literary, and linguistic collapse of standard Old English and proceeding to the age of Chaucer and perhaps a bit beyond. Readings will move through chronicles, homilies, lyrics, and acknowledged literary masterpieces such as *The Owl and the Nightingale*, the works of the *Pearl* poet, selections from *Piers Plowman*, and other poems from the 'alliterative revival.' The reading will be fairly ambitious and final projects will be required, but no background in Middle English is required.

[ENGL 423 Seventeenth-Century Lyric #
4 credits. Not offered 1992–93.]

ENGL 424 Lyric Sequences (also English 624) #
Spring. 4 credits.
To be announced. C. Levy.
The art of the lyric sequence and a sketch of its history from Dante's *La Vita Nuova* and Petrarch's *Canzoniere* (in translation as necessary) to Meredith's *Modern Love*, Berryman's *Sonnets*, and Hollander's *Powers of Thirteen*. About half the semester will be devoted to the work of Sidney, Greville, Spenser, and Shakespeare.

ENGL 426 Love Language, Money Talk in Renaissance Literature (also Society for the Humanities 415)
Spring. 4 credits.
To be announced. B. Correll.
The course will investigate the role of money in English Renaissance literature, pondering the links between money and gender, coins and characters, financial and psychic economies in Renaissance drama and poetry. Dramatic plots of exchange and succession, sexual and symbolic economies in character development and lyric structures, pursuits of exchange in dramatic and poetic texts are among the issues we will consider. Reading will include such authors as Marlowe, Shakespeare, Dekker, Jonson, Marston, Wyatt, Donne; contemporary documents on usury, patronage, credit, debt and loans; and both classical and recent cultural-theoretical material.

ENGL 427 Studies in Shakespeare
Fall. 4 credits.

Section 1: M W F 1:25–2:15. C. Levy.
Courtesy, Romance, and Shakespearean History

A study of themes and patterns in Shakespeare's later history plays (*Richard II*, Parts I and II, *Henry IV*, and *Henry V*) in the perspective afforded particularly by Castiglione's *Book of the Courtier*, Elyot's *The Governour, A Mirror for Magistrates*, and Sidney's *The Countesse of Pembrokes Arcadia*. Among topics to be explored are growth, responsibility, play, order, and community. Two short papers and a term-paper of about ten pages. Each student will conduct class-discussion on topics he or she has explored for two of those papers and on at least one other topic. No final examination.

Section 2: T R 11:40–12:55. B. Adams.
Shakespeare's English (also English 627)

A close study of selected works, non-dramatic as well as dramatic, with special attention to the distinctive features of Early Modern English as a means of coming to a fuller understanding of Shakespeare as a literary artist. The non-dramatic works will include *Venus and Adonis* and *The Rape of Lucrece*, as well as some Sonnets. The plays will include *Love's Labor's Lost, Troilus and Cressida*, and *Antony and Cleopatra*.

ENGL 429 Readings in the New Testament (also Comparative Literature 429, NES 429, and Religious Studies 429) #
Fall. 4 credits.
M W F 12:20–1:10. J. Bishop.
Close readings of representative texts from the New Testament in modern scholarly editions, with the help of appropriate commentary, introductory and specialized. The focus for 1992 will be on Acts and the letters of Paul. All readings will be in English, but repeated reference to the Greek original will be made. Graduate students and undergraduates from other colleges who are interested in the material should not feel inhibited from enrolling. The approach will be primarily exegetical; that is, we will try to find out what the texts say and what they mean by what they say. Thus we can hope to stay open to scholarly and religious issues alike.

ENGL 432 Samuel Johnson (also English 632) #
Fall. 4 credits.
T R 2:55–4:10. D. Eddy.
This is primarily a study of Johnson as author and critic, concentrating on his English poetry, periodical essays, his writing on Shakespeare, Milton, and Pope; *Rasselas*, the *Lives of the Poets*, *A Journey to the Western Islands of Scotland* plus book reviews and other literary criticism. Obviously we will include the greatest biography in the English language, Boswell's *Life of Johnson*.

ENGL 437 Fictions of Apartheid and Modes of Liberalism @
Spring. 4 credits.
To be annouced. B. Jeyifo.
This course involves a study of selected works of four major contemporary white South African authors: Athol Fugard, Nadine Gordimer, Andre Brink, and J. M. Coetzee. The genres include drama, fiction, and the essay. Issues examined include modernity and Apartheid, constructions and deconstructions of racialized identity, ideological interpellations of the subject by juridical and cultural texts, revolutionary optimism and philosophical pessimism.

[ENGL 440 English Romanticism after the Revolution #
4 credits. Not offered 1992–93.]

[ENGL 442 Libertines and License #
4 credits. Not offered 1992–93.]

ENGL 443 The Dandy in London and Dublin #
Fall. 4 credits. Prerequisites: English 202, 365 or permission of the instructor. Enrollment limited to 15 students.
W 7:30–9:30 pm. S. Siegel.
The emergences of the figure of the dandy—before and after Beau Brummell—constituted a new cultural form. This seminar will trace the transfiguration of that form, in and out of fiction, through the nineteenth century, in the Anglo-Irish tradition. Readings from emulative and satiric literary and graphic presentation in, among others, Bulwer, Carlyle, Wilde, Hichens, Baudelaire, Hazlitt, Beerbohm, Woolf, and Benjamin.

[ENGL 445 Jane Austen, Elizabeth Gaskell, George Eliot #
4 credits. Not offered 1992–93.]

ENGL 446 Victorian Poetry
Spring. 4 credits.
TBA. D. Mermin.
A study of such poets as Tennyson, Browning, Barret Browning, Arnold, Christina Rossetti, Emily Bronte, Swinburne, and Hopkins. We will read poems in a variety of forms—lyrics, dramatic monologues, short and long narratives—and consider both formal matters and questions of religion, science, gender and sexuality, the development of democracy, social change, and social conflict as they shaped and were shaped by the poetry of the period.

[ENGL 449 The Self and the Colonial Encounter: Kipling and Conrad #
4 credits. Not offered 1992–93.]

[ENGL 450 The History of the Book
4 credits. Not offered 1992–93.]

[ENGL 451 The Long Poem in America
4 credits. Not offered 1992–93.]

[ENGL 453 Public Aesthetics: Technology, Censorship, and the Arts
4 credits. Not offered 1992–93.]

[ENGL 454 Slave Narratives and the Production of Black Literature #
4 credits. Not offered 1992–93.]

[ENGL 455 Aesthetes and Decadents #
4 credits. Not offered 1992–93.]

ENGL 456 Edith Wharton, Willa Cather, and Eudora Welty (also Women's Studies 456)
Fall. 4 credits.
T R 10:10–11:25. J. Blackall.
A representative selection of the best fiction of three distinguished American women writers with particular regard for their representation of women in relation to environment, for their characteristic themes and materials, and for their practice of the craft of fiction. Readings: Wharton, *The House of Mirth, Summer, The Age of Innocence*, and selected short stories; Cather, *The Song of the Lark, My Antonia, A Lost Lady*, and selected short stories; and Welty, *The Robber Bridegroom. The Golden Apples, The Optimist's Daughter*, and selected short stories. Discussion format with three essays.

ENGL 458 Mayhem, Myth, and Modernism
Fall. 4 credits. Enrollment limited to 15 students.
T R 2:55–4:10. P. Marcus.
Vision and form in major texts from the period between the world wars. An exploration of the search for values in a troubled era and of concomitant formal experiments. The syllabus will include Lawrence, *Women in Love*; Joyce, *Ulysses* (selections); Pound, *Hugh Selwyn Mauberley* and *The Cantos*; Eliot, *The Wasteland* and *Four Quartets*; Woolf, *Mrs. Dalloway* and *To the Lighthouse*; Hemingway, *The Sun Also Rises*; and Yeats, *The Tower* and *Last Poems*. Some attention will be given to parallel developments in the visual arts and to the work of Frazer in anthropology and Jung in psychology.

[ENGL 459 Contemporary British Drama
4 credits. Not offered 1992–93.]

ENGL 460 Elijah's Manna: The Quaker Oats Man, and American Mythology: Breakfast Cereal as Cultural Archive (also Society for the Humanities 420)
Spring. 4 credits.
To be announced. J. Porte.
Beginning with a semiotic analysis of American cereal boxes, this seminar will explore the ways in which these material objects, and the industries for which they stand, both reflect the development of American culture historically and helped shape that culture. Topics to be investigated include such things as the history of food reform (vegetarianism, temperance, the "pure food" movement); the development of Battle Creek Michigan, by the Seventh Day Adventists in relation to the careers of the

Kellogg brothers; the life and writings of C. W. Post; the founding and expansion of the Quaker Oats Company and its relation to the "Puritan" past. In addition to writing by cereal makers and their advertising agents, we shall trace the links of this movement to literary texts. Readings will also include essays by Roland Barthes, Mary Douglas, and Clifford Geertz, as well as chapters in such books as Goodrum and Dalrymple, *Advertising in America* (and other studies of advertising), Steven Nissenbaum's *Sex, Diet, and Debility in Jacksonian American*, Larry Massie's *Battle Creek, the Place Behind the Products*, and Gerald Carson's *Cornflake Crusade*. The course will make extensive use of such visual materials as American paintings and advertising layouts and design.

ENGL 463 Literature in Cold War Culture, 1945–1960
Spring. 4 credits.
To be announced. B. Maxwell.
A study of literature in the period of "perpetual crisis and the garrison-prison state" (Harold Lasswell). Themes will include fear, glamour, domestic life, integration, the "white negro," addiction, loyalty, bureaucracy, and the disposition in the United States of the legacies of the Depression and of World War II. Fiction by Ralph Ellison, Jack Kerouac, Saul Bellow, Gwendolyn Brooks, and Nelson Algren (among others); collateral readings in sociology (Mills, Reisman, Whyte), social psychology (Adorno, Fromm, Erikson), aesthetics (Kracauer, Greenberg, Rahv), politics (Kennan, Arendt) and self-advertisement speeches, stand-up comedy, and magazine culture.

ENGL 464 Black Women Writers
Spring. 4 credits.
To be announced. H. Mullen.
Black women, while challenging feminism to acknowledge and explore differences among women, have also created a literature in which differences among black women, particularly differences of color and class, are meticulously observed and critically articulated. As collaborators in the creation of Afro-American culture, black women have also written perceptively about the precise inflections of gender that make differences in the experience of black women and black men. This course will focus on textual representations of color, class, and cultural differences within Afro-American communities, especially as these differences influence constructions of female identity in the texts of black women writers, including Nella Larsen, Gwendolyn Brooks, Toni Morrison, Alice Walker, Toni Cade Bambara, Paule Marshall, Adrienne Kennedy, Gayl Jones, Terry McMillan, and Andrea Lee.

[ENGL 465 Proseminar in American Studies (also American Studies 465)
4 credits. Not offered 1992–93.]

[ENGL 466 Language Poetry (also English 698 and Comparative Literature 498/698)
4 credits. Not offered 1992–93.]

ENGL 467 Culture and Technology
Spring. 4 credits.
To be announced. M. Seltzer.
Culture and Technology is an interdisciplinary investigation of "machine culture," focusing on turn-of-the-century America but including also English and French examples and contemporary literary and cultural and theoretical materials. The emphasis will be on the ways in which the life process and the machine process—bodies and machines—are coupled in machine culture. Topics will include: technologies of writing, representation, and registration; the reimagination of work in "information society" and its implications; the aesthetic and political and erotic styles of machine culture. Writers will include (for example) Rebecca Harding Davis, Jack London, Stephen Crane, Mark Twain, Bram Stoker, Villiers de L'Isle-Adam, Emile Zola, J. G. Ballard, Octavia Butler, and Thomas Harris.

ENGL 468 James Baldwin (also English 686)
Spring. 4 credits.
To be announced. K. McClane.
In the thirty years since his first novel, *Go Tell It on the Mountain*, James Baldwin has continued his eloquent, painful, and brilliant analysis of the American search for an identity encyclopedic enough to embrace the presence of Black people. Reading widely among his fiction, essays, and drama, we will appreciate why Baldwin remains our best chronicler of the rage and love, bitterness and hope, and desire and despond, that, when taken together, form so crucial a part of the Afro-American and American genesis. Readings will include *Notes of a Native Son, Another Country, Sonny's Blues, Go Tell It on the Mountain, Blues for Mr. Charlie, Giovanni's Room, Going to Meet the Man*, and *Just above My Head*.

[ENGL 472 Irish Culture
4 credits. Not offered 1992–93.]

[ENGL 474 The Book in Society #
4 credits. Not offered 1992–93.]

[ENGL 475 Feminist Literary Criticism
4 credits. Not offered 1992–93.]

ENGL 478 Self and Nation in Asian American Literature (also Asian American Studies 478)
Fall. 4 credits.
T R 2:55–4:10. S. Wong.
A study of the ways in which Asian American writers have constructed discourses of self and nation. Topics will include nationalism, feminism, identity politics, and theories of minority discourse. In our reading of selected works of prose, poetry and drama by Chinese American, Filipino American, Japanese American, and Korean American writers, we will be asking questions about the relation of these works to the moment of their production and reception, and the manner in which these textual representations engage with shifting cultural and political struggles. Writers under discussion may include: Carlos Bulosan, Theresa Hak Kyung Cha, Frank Chin, Jessica Hagedorn, David Henry Hwang, Maxine Hong Kingston, Joy Kogawa, David Mura.

ENGL 480–481 Seminar in Writing
Fall and spring. 4 credits. Each section limited to 15 students. Students are encouraged to take English 280–281 and either 382–383 or 384–385 previously. Prerequisite: permission of instructor, normally on the basis of a manuscript.
480 Fall: M 2:30–4:25, K. McClane; T R 12:20–1:10, S. Vaughn. 481 Spring: TBA. R. Morgan; TBA. E. Wilson.
Intended for those writers who have already gained a basic mastery of technique. Students normally enroll for both terms and should be capable of a major project—a collection of stories or poems, a group of personal essays, or perhaps a novel—to be completed by the end of the second semester. Seminars are used for discussion of the students' manuscripts and published works that individual members have found of exceptional value.

ENGL 485 Poetry of Things: A Workshop (also Society for the Humanities 406)
Fall. 4 credits.
T 2:30–4:25. R. Morgan.
A seminar devoted both to the writing of poetry and the study of the poetry of objects. Discussion will focus on the work by participants, and on the importance of objects in modern poetry, and the ways in which ordinary things, machines, even garbage, are rediscovered and transformed by poetry. Special emphasis will be given to accuracy in description, metaphor and moral, and the ways in which everyday things of our world are made new, strange, even sacred, by poetry. In the light of modern science and linguistics, how does poetry help us know the world of things? Readings will include examples of *Dinggedichte* in German poetry, texts by Francis Ponge and Jean Follain in French, Pablo Neruda in Spanish, as well as poems by contemporary Americans.

ENGL 491 Honors Seminar I
Fall. 4 credits. Prerequisite: permission of director of the Honors Program.

Section I. Virginia Woolf. Enrollment limited to 15 students. (also Women's Studies 491)
T R 11:40–12:55. M. Hite.
This seminar will consider six major novels—*Mrs. Dalloway, To the Lighthouse, Orlando, The Waves, The Years* (along with Woolf's unfinished novel/essay *The Pargiters*), and *Between the Acts*—as well as *A Room of One's Own, Three Guineas*, and a selection of the shorter essays. We will also look at relevant material from the diaries and occasionally from the letters. Class members will give at least two presentations over the course of the semester and will be expected to participate regularly in discussions. Some short in-class writings, two major papers (10–15 pages).

Section II. Spenser and Malory.
T R 2:55–4:10. C. Kaske.
We will read closely paired selections covering two-thirds of Malory's *Morte D'Arthur* and of Spenser's *Faerie Queene*. Through this comparison we will formulate a definition of Arthurian romance and assess literary influence and the distinctive genius of each author in this vein. Informal lecture and discussion. Two papers.

ENGL 492 Honors Seminar II
Spring. 4 credits. Prerequisite: permission of director of the Honors Program.
Section 1. Shakespeare and Religion
To be announced. B. Adams.
Study of selected plays by Shakespeare in light of the religious views of his age. Topics: the "Old" religion, Puritan doctrine and practice, the Bible and service books, faith and skepticism, theological controversy, preaching. Plays: *The Merchant of Venice, Hamlet, Measure for Measure*. Familiarity with the Christian Bible and Christian doctrine desirable but not necessary.
Section 2. Four Post-War American Poets: Elizabeth Bishop, Robert Lowell, John Ashbery, and Adrienne Rich.

To be announced. R. Gilbert.
A close consideration of four significant poets of the last four decades. We will consider individual poems as well as the published collections in which they appear, trace each poet's career book by book, while simultaneously aiming for a more general understanding of the shifting relations between self, world, history, and language as reflected in their poems. Other topics to be explored: the various ways in which these poets both extend and modify the projects of modernist poetics, different senses of poetic forms in their work; the notion of period style. Intensive reading in the poetry, with some prose as well. In addition, some supplementary reading in other contemporary poets will be assigned to help provide a literary context. Four 5–8 page papers; one or two oral reports. Limited enrollment.

ENGL 493 Honors Essay Tutorial I
Fall or spring. 4 credits. Prerequisites: senior standing and permission of Director of the Honors Program.
Staff.

ENGL 494 Honors Essay Tutorial II
Fall or spring. 4 credits. Prerequisites: English 493 and permission of Director of the Honors Program.
Staff.

ENGL 495 Independent Study
Fall or spring. 2–4 credits. Prerequisites: Permission of departmental adviser and director of Undergraduate Studies.
Staff.

Courses Primarily for Graduate Students

Permission of the instructor is a prerequisite for admission to courses numbered in the 600s. These are intended primarily for graduate students, although qualified undergraduates are sometimes admitted. Undergraduates seeking admission to a 600-level course should consult the instructor. The list of courses given below is illustrative only; a definitive list, together with course descriptions and class meeting times, is published in a separate department brochure before course enrollment each term.

Graduate English Courses 1991–92

Fall

ENGL 600 Colloquium for Entering Students

ENGL 611 Introduction to Old English (also English 411)
A. Galloway.

ENGL 613 Women Writers in the Middle Ages
A. Galloway.

ENGL 617 The Ideology of Europe: Studies in Medieval Literature (also Comparative Literature 617)
W. Cohen.

ENGL 627 Shakespeare's English (also English 427.2)
B. Adams.

ENGL 632 Samuel Johnson (also English 432)
D. Eddy.

ENGL 633 Eighteenth-Century Survey
F. Bogel.

ENGL 645 Victorian Poetry
D. Mermin.

ENGL 648 Dickens
P. Sawyer.

ENGL 653 The Question of Modernism
S. Siegel.

ENGL 664 American Poetry 1910–1930
R. Gilbert.

ENGL 667 Murder and Machine Culture
M. Seltzer.

ENGL 682 African Matrix
H. Mullen and B. Jeyifo.

ENGL 702 Introduction to Literary Theory (also English 302)
J. Culler.

ENGL 721 Baroque
T. Murray.

ENGL 734 Colonialism and Eighteenth-Century Literature
Laura Brown.

ENGL 780.1 MFA Seminar: Poetry
P. Janowitz.

ENGL 780.2 MFA Seminar: Fiction
L. Herrin.

Spring

ENGL 603 An Introduction to Early Medieval Archaeology and Culture (also Archaeology 311, English 311)
R. Farrell.

ENGL 612 *Beowulf* (also English 412)
T. Hill.

ENGL 614 Middle English (also English 413)
A. Galloway.

ENGL 619 Chaucer
W. Wetherbee.

ENGL 621 Renaissance Epic
G. Teskey.

ENGL 624 Lyric Sequences (also English 424)
C. Levy.

ENGL 631 Politics and the Passions: Hobbes to Rousseau
N. Saccamano.

ENGL 642 Romantic Writing
C. Chase.

ENGL 651 Irish Comic Drama
S. Siegel.

ENGL 662 American Violence
S. Samuels.

ENGL 686 Baldwin (also English 468)
K. McClane.

ENGL 691 Derrida, Writing, and the Institute of Literature (also Comparative Literature 680)
J. Culler.

ENGL 710 Advanced Reading in Old English
T. Hill.

ENGL 765 Dickinson
D. Fried.

ENGL 781.1 MFA Seminar: Poetry
A. Ammons.

ENGL 781.2 MFA Seminar: Fiction
M. McCoy.

ENGL 785 Reading of Poetry
S. Vaughn.

FILM

See listings under Department of Theatre Arts.

FRENCH LANGUAGE AND LINGUISTICS

See Department of Modern Languages and Linguistics.

FRENCH LITERATURE

See Department of Romance Studies.

FRESHMAN WRITING SEMINARS

For information about the requirements for freshman writing seminars and descriptions of seminar offerings, see p. 304 and consult the John S. Knight Writing Program brochure, available from college registrars in August for the fall term and in November for the spring term.

GEOLOGICAL SCIENCES

D. E. Karig, chair; A. L. Bloom, director of undergraduate studies; R. Allmendinger, M. Barazangi, W. A. Bassett, J. M. Bird, L. D. Brown, L. M. Cathles, J. L. Cisne, B. L. Isacks, T. E. Jordan, R. W. Kay, J. E. Oliver, F. H. T. Rhodes, W. B. Travers, D. L. Turcotte, W. M. White

As an intercollege unit, the Department of Geological Sciences has degree programs in both the College of Arts and Sciences and the College of Engineering.

Within the past few years, studies of the earth have become increasingly important. The need for increased understanding of plate tectonics, limited energy and mineral reserves, awareness of natural hazards such as earthquakes and volcanic eruptions, and an increasing concern for our environment encourage studies of the earth by geologists. Consequently, interest in geology courses has greatly increased.

There are seventeen faculty members, including Cornell's president, in the department, and thirty undergraduate majors. A variety of courses provides our students with a broad and solid foundation. The department is particularly strong in geophysics, petrology and geochemistry, structural geology, and tectonics.

Students study the deeper parts of the earth's crust using many techniques but concentrating on seismic methods. High-pressure, high-temperature mineralogy research uses the diamond anvil cell and Cornell's synchrotron as research tools. Undergraduates have served as field assistants for faculty and graduate students who work in Greenland, British Columbia, the Aleutian Islands, Scotland, Barbados, the South Pacific, South America, and various parts of the continental United States. Undergraduates are encouraged to participate in research activities, sometimes as paid assistants.

Students who major in geological sciences are encouraged to take courses appropriate to their interests in the other sciences and mathematics. To develop skills in observing the natural earth, geology majors attend a summer field camp, usually during the summer following their junior year.

The Major

The prerequisites for admission to a major in geological sciences in the College of Arts and Sciences are two two-semester sequences, Mathematics 111–112 or 191–192 and Physics 207–208 or 112–213, or their equivalents, and a semester course in chemistry, such as Chemistry 207 or 211. Geological Sciences 101,103, 111, or 201 followed by 102, 104, or 202 are recommended, but a student with a strong foundation in mathematics and science may be accepted as a major without completion of an introductory sequence.

Majors take Geological Sciences 210 and 214, the five core courses in geological sciences, a summer field geology course, 6 credits of additional course work from geological sciences courses numbered 300, 400, or 600, plus an additional course in either computer science or biological science, or an intermediate-level course in biological science, mathematics, chemistry, or physics.

Core Courses

GEOL 326 Structural Geology

GEOL 355 Mineralogy

GEOL 356 Petrology and Geochemistry

GEOL 375 Sedimentology and Stratigraphy

GEOL 388 Geophysics and Geotectonics

Prospective majors should consult one of the following departmental major advisers—W. A. Bassett, A. L. Bloom, L. M. Cathles, J. L. Cisne, or B. L. Isacks—as early as possible for advice in planning a program. Students majoring in geological sciences may attend the departmental seminars and take advantage of cruises, field trips, and conferences offered through the Department of Geological Sciences.

Courses offered at the 100 and 200 level are open to all students. Certain 300-level courses in geology may be of particular interest to students of chemistry, biology, ecology, and physics. Students are encouraged to inquire about courses that interest them at the department office in Snee Hall.

Honors. An honors program is offered by the Department of Geological Sciences for superior students. Candidates for honors must maintain an overall 3.0 grade-point average and a cumulative average of 3.5 in the major and complete an honors thesis (Geological Sciences 490). Students interested in applying should contact the director of undergraduate studies during the second semester of the junior year.

Courses

For course descriptions, see the Geological Sciences listing in the College of Engineering.

GEOL 101 Introductory Geological Sciences
Fall, spring, or summer. 3 credits.
2 lecs, 1 lab, field trips, evening exams.
Fall: W. B. Travers; spring: J. M. Bird.
This course teaches observation and understanding of the earth, including oceans, continents, coasts, rivers, valleys, and glaciated regions; earthquakes, volcanoes, and mountains; theories of plate tectonics; the origin, discovery, and development of mineral and water resources. The lab teaches use of topographic and geologic maps and recognition of minerals and rocks and includes field trips to Cascadilla Gorge, Fall Creek, and Enfield Glen.

GEOL 102 Evolution of the Earth and Life

GEOL 103 Introductory Geology in the Field

GEOL 104 The Sea: An Introduction to Oceanography

GEOL 107 Frontiers of Geology I

GEOL 108 Frontiers of Geology II

GEOL 111 To Know the Earth

GEOL 201 Introduction to the Physics and Chemistry of the Earth

GEOL 202 Environmental Geology

GEOL 204 Hydrology and the Environment

GEOL 210 Introduction to Field Methods in Geological Sciences

GEOL 212 Special Field Trip

GEOL 213 Marine and Coastal Geology

GEOL 214 Western Adirondack Field Course

GEOL 326 Structural Geology

GEOL 355 Mineralogy

GEOL 356 Petrology and Geochemistry

GEOL 375 Sedimentology and Stratigraphy

GEOL 388 Geophysics and Geotectonics

GEOL 410 Field Geology

GEOL 424 Petroleum Geology

GEOL 432 Digital Processing and Analysis of Geophysical Data

GEOL 433 Exploration Seismology I: Data Acquisition and Processing

GEOL 434 Exploration Seismology II: Analysis and Interpretation

GEOL 437 Geophysical Prospecting

GEOL 441 Geomorphology

GEOL 442 Glacial and Quaternary Geology

GEOL 445 Geohydrology

GEOL 452 X-Ray Diffraction Techniques

GEOL 453 Modern Petrology

GEOL 454 Advanced Mineralogy

GEOL 456 Geochemistry

GEOL 458 Volcanology

GEOL 474 Modern Depositional Systems

GEOL 476 Sedimentary Basins: Tectonics and Mechanics

GEOL 478 Advanced Stratigraphy

GEOL 479 Paleobiology

GEOL 481 Senior Survey of Earth Systems
Fall. 3 credits. Limited to seniors majoring in geological sciences
1 lec. and 1 disc. J. M. Bird.
Survey course that integrates undergraduate course work, intended to enhance overall understanding of geological sciences. Emphasis on current models of Earth's dynamic systems (global climate change; mantle evolution). Guest lecturers; synthesis and review literature, *Scientific American* readings; discussions; student presentations.

GEOL 489 Earthquakes and Tectonics

GEOL 490 Senior Thesis

GEOL 491–492 Undergraduate Research

GEOL 500 Design Project in Geohydrology

GEOL 501 Geohydrology Design Project Seminar

GEOL 502 Case Histories in Ground Water Analysis

GEOL 621 Marine Tectonics

GEOL 622 Advanced Structural Geology I

GEOL 624 Advanced Structural Geology II

GEOL 625 Tectonic History of Western North America from Craton to Terranes

GEOL 628 Geology of Orogenic Belts

GEOL 635 Advanced Geophysics I

GEOL 637 Advanced Geophysics II

GEOL 655 Isotope Geochemistry

GEOL 681 Geotectonics

GEOL 687 Seismology

GEOL 695 Computer Methods in Geological Sciences

GEOL 700–799 Seminars and Special Work

GEOL 721 Tectonic and Stratigraphic Evolution of Sedimentary Basins

GEOL 722 Advanced Topics in Structural Geology

GEOL 725 Rock and Sediment Deformation

GEOL 731 Plate Tectonics and Geology

GEOL 741 Advanced Geomorphology Topics

GEOL 751 Petrology and Geochemistry

GEOL 753 Mineralogy and Crystallography, X-Ray Diffraction, Microscopy, High-Pressure/Temperature Experiments

GEOL 755 Advanced Topics in Petrology and Tectonics

GEOL 757 Current Research in Petrology

GEOL 762 Advanced Topics in Petroleum Exploration

GEOL 771 Advanced Topics in Sedimentology and Stratigraphy

GEOL 773 Paleobiology

GEOL 780 Seismic Record Reading

GEOL 781 Geophysics, Exploration Seismology

GEOL 783 Advanced Topics in Seismology and Tectonics

GEOL 788 Geophysics, Seismology, and Geotectonics

GEOL 789 Research on Seismic-Reflection Profiling of the Continental Crust

GEOL 793 Andes Seminar

GEOL 796 Geochemistry of the Solid Earth

GEOL 797 Fluid-Rock Interactions

GEOL 799 Contemporary Issues in Groundwater Hydrology

GERMAN STUDIES

D. Bathrick, chair; G. Waite, director of undergraduate studies; N. Alter, B. Buettner, H. Deinert, I. Ezergailis, S. L. Gilman, A. Groos, P. U. Hohendahl, B. Martin, P. M. Mitchell, L. M. Olschner

The Department of German Studies offers courses in German, Medieval German, Yiddish, and Old Icelandic area studies. Major areas of specialization cover the period from the early Middle Ages to the twentieth century. While the emphasis remains on literature, the department teaches film, theater, the political culture of Germany, women's studies, music, intellectual history, history of science, and Jewish studies. Courses are designed with the general student population in mind; courses taught in German demand knowledge of the German language. The department often cosponsors courses with the departments of Comparative Literature, History, History of Art, Government, Music, Near Eastern Studies, and Theatre Arts, as well as with the Medieval Studies and Women's Studies programs. For further information about majors and courses, see Modern Languages and Linguistics.

The Major

Students majoring in German are encouraged to design their programs in a manner that will allow for diversity in their courses of study. It should enable them to become acquainted with an adequate selection of major works, authors, and movements of German literature and to develop their skill in literary analysis. Students majoring in German will normally proceed through German 201, 202, 203, 204. Students who, because of previous training, are qualified to enroll in 300- or 400-level courses will be permitted to do so. For details, students may consult the director of undergraduate studies, G. Waite, in the Department of German Studies, or W. Harbert, in the Department of Modern Languages and Linguistics. Students majoring in German are expected to complete successfully a minimum of six 300- and 400-level courses in addition to German 303–304; one of the required courses must be a senior seminar (German Studies 410). Some 200-level courses offered by this department (such as German Studies 211 and 283) and related departments will count toward the major as well; please consult your adviser. These courses should be a representative selection of subjects in German literature, Germanic linguistics, or both. The attention of students majoring in German is called to the courses offered by departments and programs such as Anthropology, Comparative Literature, History, History of Art, Government, Music, Society for the Humanities, Theatre Arts, and Women's Studies, many of which complement the course offerings in German.

Students majoring in German are expected to become competent in the German language. This competence is normally demonstrated by the successful completion of German 304. Placement of German majors who have done no work in German at Cornell will be determined by the level of preparation they have obtained elsewhere. For information, students should consult the director of undergraduate studies, G. Waite, or W. Harbert.

The German Area Studies Major

The German area studies major is intended for students who are interested in subject matter related to German-speaking countries but not necessarily or not exclusively in German literature or linguistics. Students will select appropriate courses offered in history, government, economics, music, theater arts, or other suitable subjects. Minimum course requirements for the German area studies major are the same as for the German major. These students will select a committee of two or more faculty members to help them design a program and supervise their progress. One committee member must be from the German faculty of either the Department of Modern Languages and Linguistics or the Department of German Studies. The other member(s) should represent the student's main area of interest.

The student majoring in German area studies is expected to become competent in the German language. Such competence is normally demonstrated by successful completion of German 304. A minimum of six area courses above the 200-level is required for the major; one of the six required courses must be a senior seminar (German Studies 410).

Advanced Standing. Students coming to Cornell with advanced standing in German and/or another subject often find it possible to complete two majors. Recent double majors have combined history, psychology, chemistry, biology, or physics with German literature or German area studies. Students in Agriculture and Engineering have entered dual degree programs.

Honors. The honors program in German is open to superior students who want to work independently in an area of their own choice. Students are free to select any faculty member of the Field of Germanic Studies (in the case of area studies majors, the appropriate member of their committee) to assist them in designing their honors program, to supervise their work, and to help them select a suitable topic for an honors essay. The independent study courses, German 451 and 452, may form part of the program.

Study Abroad

Cornell has a formal agreement with the University of Hamburg enabling its undergraduates to take courses in any field offered by the German university. The program offers a challenging course of study and the experience of total immersion in German life and culture. Participants in this program attend a required 3-credit orientation course in September, which is designed to help them adjust to the academic and social life of Germany. Special field trips are organized as part of the orientation session. Beginning in mid-October, students enroll as fully matriculated students at the University of Hamburg.

Cornell maintains a center in Hamburg with appropriate support staff. The resident director is a faculty member from Cornell, who teaches a special seminar each semester, provides academic advice, and helps ensure the quality of the courses. The center, which includes a classroom, a small library, and word-processing facilities, is used by students for the orientation session, special seminars, tutorials, lectures, and informal gatherings.

Applicants are expected to have attained at least proficiency in German prior to departure. Students are strongly encouraged to study abroad for the entire year rather than for one semester. For further information, students should contact the director of undergraduate studies and the director of Cornell Abroad.

Freshman Writing Seminar Requirement

The following courses will satisfy the freshman writing seminar requirement: German 109, 151, 175, 211, and 312. For details students should consult the instructors.

Fees. Depending on the course, a small fee may be charged for film rental or photocopied texts for course work.

Literature

Freshman Writing Seminars

See Freshman Seminar booklet for course times and descriptions.

GERST 109 Fairy Tales and the Literary Imagination
Fall or spring. 3 credits.
I. Ezergailis and staff.

GERST 151 Kafka, Hesse, Brecht, and Mann
Fall or spring. 3 credits.
H. Deinert, S. L. Gilman, and staff.

GERST 175 Cinema and Society
Fall or spring. 3 credits.
D. Bathrick, G. Waite, and staff.

Courses Offered in German

GERST 201 Introduction to German Literature I: Prose
Fall or spring. 3 credits. Prerequisite: qualification in German or permission of instructor. Taught in German. Fulfills both the language proficiency requirement and, followed by German 202 or another German literature course at the 200 level or above, the humanities distribution requirement.
B. Buettner and staff.
An intermediate course designed to improve reading, writing, speaking, and listening skills in German. Emphasis is placed on developing reading competency, tools of literary analysis, and expansion of vocabulary. Grammar review included. The complexities of inner and outer reality as expressed in selected prose works of Bachmann, Brecht, Kafka, Mann, Dürrenmatt, Aichinger and others.

GERST 202 Introduction to German Literature II: Drama
Fall or spring. 3 credits. Prerequisite: German 201 or permission of instructor. Taught in German. Fulfills both the language proficiency requirement and, together with German 201 or another German literature course at the 200 level or above, the humanities distribution requirement.
B. Buettner and staff.
An intermediate course designed to improve reading, writing, speaking, and listening skills in German. Emphasis is placed on developing reading competency, tools of literary analysis, and expansion of vocabulary. Self-confrontation and social conflict in the plays of major Austrian, Swiss, and German dramatists, including Dürrenmatt, Brecht, Frisch, Hofmannsthal, Goethe, and Schiller.

GERST 211 Intensive Workshop in Germanic Studies for Freshmen I #
Fall. 6 credits. Intended for entering freshmen with extensive training in the German language (CPT achievement score of 650 or comparable evidence; please consult instructor). Taught in German. Satisfies the language and distribution requirements *or* the freshman writing seminar requirement.
H. Deinert.
Not intended as a survey but rather as a rigorous seminar designed to familiarize students with literary forms and the tools of critical analysis. The course will provide an intensive introduction to the study of German literature through the discussion of exemplary prose works, dramas, and poems from the eighteenth and nineteenth centuries.

GERST 307 Modern Germany
Spring. 4 credits. Prerequisite: German 201–202 or equivalent. Taught in German.
Staff.
Introduction to the history of postwar Germany, the development of the two Germanys, and their societies. The emphasis is on cultural and social institutions such as mass media, educational systems, and political parties. Further topics include women, reunification, the student movement, and terrorism. We will also follow the rapid changes taking place in Germany today in light of the recent past. Texts are complemented by films and music.

GERST 312 Intensive Workshop in Germanic Studies for Freshmen II
Spring. 4 credits. May be used to satisfy the freshman writing seminar requirement. Taught in German.
I. Ezergailis.
Designed primarily as a sequel to German 211. Emphasis is on German literature since 1900 (T. Mann, Hesse, Kafka, Brecht, Dürrenmatt, Peter Weiss, Plenzdorf, Rilke, Benn, Celan). Supplementary reading from contemporary philosophy, psychology, sociology, and political theory.

[GERST 315 German Poetry from the Middle Ages to the Present #
Fall. 4 credits. Prerequisite: German 201–202 or permission of instructor. Not offered 1992–93.
L. M. Olschner.]

[GERST 337 The German *Novelle*
Fall. 4 credits. Prerequisite: German 201–202 or permission of instructor. Taught in German. Not offered 1992–93.
B. Buettner.]

GERST 353 Kleist #
Fall. 4 credits. Prerequisite: German 201–202 or permission of instructor. Taught in German.
H. Deinert.
The Prussian aristocrat Heinrich von Kleist, who has been compared by some to Aeschylos and Shakespeare, committed suicide in 1811 at the age of thirty-four because "I have run out of options." We will examine his dramas and prose writings against the background of revolutionary turmoil in Europe and the Americas and the Wars of National Liberation.

[GERST 354 Schiller #
Spring. 4 credits. Prerequisite: German 201–202 or permission of instructor. Taught in German. Not offered 1992–93.
H. Deinert.]

[GERST 355 The Age of Goethe #
Not offered 1992–93.]

[GERST 356 Goethe's *Faust* #
Spring. 4 credits. Prerequisite: German 201–202 or permission of instructor. In addition to the regularly scheduled class time, there will be take home assignments and individual conferences. Not offered 1992–93.
G. Waite.]

[GERST 357 Major Works of Goethe #
Spring. 4 credits. Prerequisite: German 201–202 or permission of instructor. Taught in German. Not offered 1992–93.
H. Deinert.]

[GERST 358 Romanticism #
Fall. 4 credits. Prerequisite: German 201–202 or permission of instructor. Taught in German. Not offered 1992–93.
G. Waite.]

[GERST 359 Heine and Büchner #
Spring. 4 credits. Prerequisite: German 201–202 or permission of instructor. Taught in German. Not offered 1992–93.
G. Waite.]

[GERST 360 Naturalism and Feminism #
Not offered 1992–93.]

[GERST 362 Modern German Literature II: Twentieth-Century Prose
Not offered 1992–93.]

[GERST 363 Contemporary Literature
Not offered 1992–93.]

[GERST 364 German Lyric Poetry of the Nineteenth Century #
Fall. 4 credits. Prerequisite: German 201–202 or permission of instructor. Taught in German. Not offered 1992–93.
L. M. Olschner.]

[GERST 365 German Poetry of the Twentieth Century
Fall. 4 credits. Prerequisite: German 201–202 or permission of instructor. Not offered 1992–93.
L. M. Olschner.]

[GERST 367 From Thomas Mann to Christa Wolf
Spring. 4 credits. Prerequisite: German 201–202 or permission of instructor. Taught in German. Not offered 1992–93.
D. Bathrick.]

GERST 369 Modern German Drama after World War II
Spring. 4 credits. Prerequisite: German 201–202 or permission of instructor.
N. M. Alter.
This course will concentrate on central thematic and formal concerns of post-World War II drama. Through an examination of aesthetic and political changes we will look at how these events are represented in theater. How are issues such as the Holocaust, the dropping of the atomic bomb, feminism, globalization, played out on stage? We will also look at how theater functions as an institution—how does it question itself and what are its limits and possibilities as a social form? Playwrights will include Weiss, Frisch, Dürrenmatt, Kipphardt, Hochhuth, Bachmann, Jelinek, Reinshagen, Müller, Strauss, and others.

[GERST 398 German Women Writers
Fall. 4 credits. Prerequisite: German 201–202 or permission of instructor. Taught in German. Not offered 1992–93.
I. Ezergailis.]

Courses in English Translation

[GERST 283 Contemporary European Society and Culture (also Goverment 343 and History 283)
Spring. 3 credits. Not offered 1992–93.
G. Waite, J. Pontusson, J. Weiss.]

[GERST 285 Contemporary European Society and Politics (also History 285 and Government 285)
Fall. 4 credits. Not offered 1992–93.
S. L. Gilman, J. Pontusson.]

[GERST 314 Nietzsche, the Man and the Artist #
Spring. 4 credits. Not offered 1992–93.
S. L. Gilman.]

[GERST 320 Postwar German Novel
Spring. 4 credits. Not offered 1992–93.
I. Ezergailis.]

GERST 322 Medicine and Civilization (also Biology and Society 322) #
Fall. 3 credits.
S. L. Gilman.
What is sickness? What is health? Who is the physician? Is a physical illness different from mental illness? Where is medicine practiced? Is being a patient or a doctor different from culture to culture and from age to age? This course will introduce the undergraduate student to the historical and cultural context of medicine. Our sources will range from the texts of ancient Greek medicine to contemporary films and novels dealing with medicine. We will examine the historical and social context of mental illness as well as physical illness from the standpoint of patient, physician, and "society." All of the primary readings are available in English.

GERST 325 Culture of the Spectacle: Media and Cultural Representation (also Comparative Literature 325)
Fall. 4 credits.
N. M. Alter.
Because modern society has become increasingly permeated with messages communicated through media representations, there is growing suspicion that our world is a series of visual spectacles. This course will examine how the spectacularization of social, historical, and political events affects our perception and understanding of them. In effect, does the mass reproduction and replay change or alter an event? How do artists respond to an increasingly televisual world? Topics may include the Vietnam War, the Baader-Meinhof group, JFK assassination, the fall of the Berlin Wall, the Gulf war, etc.

Primary material will focus on film, theater, video, performance art, visual art, etc., informed by theoreticians such as Adorno, Baudrillard, Chomsky, Debord, Fiske, Ulmer and others.

[GERST 327 Health and Disease (also Biology and Society 327 and Psychology 387) @
Fall. 3 credits. Not offered 1992–93.
S. L. Gilman and others.]

[GERST 330 Political Theory and Cinema (also Government 370)
Fall. 4 credits. Not offered 1992–93.
G. Waite.]

[GERST 338 Nineteenth-Century Drama #
Fall. 4 credits. Prerequisite: German 201–202 or permission of instructor. Not offered 1992–93.
I. Ezergailis.]

[GERST 346 German Women Writers in Translation (also Women's Studies 346)
Spring. 4 credits. Not offered 1992–93.
B. Martin.]

[GERST 347 Reading Freud: Race, Gender, and Psychoanalysis (also Comparative Literature 347, English 347, and Psychology 389) #
Spring. 3 credits. Lecture and discussion. In English. Not offered 1992–93.
M 1:25–3:20. S. L. Gilman.]

[GERST 348 Women in Medieval Literature (also Comparative Literature 349 and Women's Studies 349) #
Spring. 4 credits. Not offered 1992–93.
B. Buettner.]

[GERST 349 Anti-Semitism in Germany and the Jewish Response (also Near Eastern Studies 349) #
Fall. 3 credits. Reading knowledge of German helpful, though the basic texts will be read in English. Not offered 1992–93.
S. L. Gilman.]

[GERST 350 Yiddish Literature in English Translation
Not offered 1992–93.]

GERST 354 Modern Drama (also Theatre Arts 327 and Comparative Literature 354)
Spring. 4 credits.
P. U. Hohendahl.
Readings in European drama from Ibsen to the present.

[GERST 359 Sexual and Social Differences in Late Nineteenth-Century German Literature and Culture (also Women's Studies 335) #
Fall. 4 credits. Not offered 1992–93.
B. Martin.]

[GERST 366 Broch and Musil
Fall. 4 credits. There will be an additional discussion section for students who can read the original German. Not offered 1992–93.
I. Ezergailis.]

[GERST 374 Music and Drama (also Music 374) #
Fall. 4 credits. Prerequisite: any three-credit music course or proficiency in German or Italian. Not offered 1992–93.]

[GERST 381 Marxist Cultural Theory (also Comparative Literature 381 and Government 372)
Spring. 4 credits. Not offered 1992–93.
W. Cohen, P. U. Hohendahl.]

[GERST 396 German Film (also Comparative Literature 396 and Theatre Arts 396)
Spring. 4 credits. Requirements: participation in class discussion, one paper, midterm, and final. Not offered 1992–93.
D. Bathrick.]

[GERST 399 Forms of Opposition: German Women Writers on the Nazi Period (also Comparative Literature 399 and Women's Studies 399)
Not offered 1992–93.]

GERST 411 African Americans and Jewish Americans: Identities, Parallels, and Conflicts (also Africana Studies 411 and Jewish Studies 411)
Spring. 4 credits. Prerequisite: permission of instructors. Maximum: 20 students. Meetings once a week for two hours to enable screening of in-class films. Central to the structure of the seminar will be bi-weekly role-playing sessions in which students enact a problem or historical context based on detailed readings.
S. Gilman and W. Cross.
The course will explore the identity issues affecting both groups and their interactions. It will focus on the cultural politics of both Jewish Americans and African Americans together with an analysis of their conflicts. An important secondary concern will be how gender definitions impact both groups. Further issues will deal with the broader question of "nationalism" and the myth of dual identity (Africa/Israel); the role urban identity has assumed in late twentieth-century America in defining as well as being defined by both groups. This is of interest as the urbanization of Jewish Americans and African Americans occurred over the first half of the twentieth century. A constant emphasis will be on parallels, intersections, and differences.

[GERST 419 Thomas and Heinrich Mann
Fall. 4 credits. Not offered 1992–93.
I. Ezergailis.]

[GERST 438/648 East and West German Drama: Post-1945 (also Theatre Arts 438/648)
Fall. 4 credits. Not offered 1992–93.
D. Bathrick.]

[GERST 444/644 The Holocaust Survivor as Author (also Near Eastern Studies 444)
Spring. 3 credits. Reading knowledge of German helpful; however two of the major novels are available in English. Not offered 1992–93.
S. L. Gilman.]

Course in Latvian

[GERST 376 Contemporary Soviet Latvian Literature
Fall. 4 credits. Prerequisite: permission of instructor. Taught in Latvian. Not offered 1992–93.
I. Ezergailis.]

Graduate and Advanced Undergraduate Courses

GERST 405 Introduction to Medieval German Literature I #
Fall. 4 credits. Prerequisite: reading knowledge of German. Not offered 1992–93.
A. Groos.
After a brief introduction to basic aspects of the medieval universe, ranging from cosmology to psychology, readings will focus on introductory texts of late twelfth-century courtly culture. Using the predominant genres of aristocractic self-representation, the heroic epic (*Nibelungenlied*), Arthurian romance (Hartmann's *Iwein*), and Minnesang, discussions will investigate the court as the locus of conflicting forces in the rise of the secular culture in Germany, examining such issues as the first vernacular construction of social and sexual identity, generational conflicts within the communal/dynastic order, the rise of individualism (the knightly quest), and subjectivity (the love lyric).

GERST 406 Introduction to Medieval German Literature II #
Spring. 4 credits. Prerequisite: German 405 or equivalent. This is the anchor course for the medieval period.
A. Groos.
Political lyrics by Walther von der Vogelweide will introduce agendas of conflict in thirteenth-century German culture, ranging from crusades to civil war. Against this background, we will examine the utopian quest to win the Holy Grail and heal the Fisher King in Wolfram's *Parzival*, using Bakhtin's approach to pre-novelistic discourse. Readings from the love lyric trace representations of gender across emerging class differences, the increasing complexity of the self, and instabilities of the performance text. Concluding topics include women mystics and late medieval narratives of socio-sexual violence, anti-Semitism, and urban *Angst*.

GERST 410 Senior Seminar
Fall. 4 credits. Prerequisite: 201–202 or equivalent. Required for the major. Open to all qualified students.
I. Ezergailis.
Topic for 1992–93: German Women Writers. We will read poetry, prose, and drama by a selection of twentieth-century writers such as Else Lasker-Schüler, Christa Wolf, Ingeborg Bachmann, Friederike Roth. "Women and Language" will be one dominant theme, but the discussion should range widely, as texts and student seminar presentations will form the core of an intensive workshop atmosphere.

[GERST 412 History and Society in the Postwar Short Story and Radio Play
Fall. 4 credits. Prerequisite: 201–202 or permission of instructor. Taught in German. Not offered 1992–93.
L. M. Olschner.]

[GERST 416 Literary Translation in the West (also Comparative Literature 416)
Spring. 4 credits. Prerequisite: good reading knowledge of German or French; any other language(s) desirable. Not offered 1992–93.
L. M. Olschner.]

[GERST 417 Fascism and Mass Culture (also Comparative Literature 417, Society for the Humanities 417, and Theatre Arts 417)
Fall. 4 credits. Taught in English. For advanced undergraduate and graduate students. Not offered 1992–93.
D. Bathrick.]

GERST 451–452 Independent Study
451, fall; 452, spring. 1–4 credits each term. Prerequisite: permission of instructor.
Hours to be arranged. Staff.

[GERST 490 From Literary Criticism to Marxist Theory: The Early Georg Lukács (also Comparative Literature 490 and Government 470)
Fall. 4 credits. For advanced undergraduates and graduate students. Not offered 1992–93.
P. U. Hohendahl.]

[GERST 491 Mass Culture Revisited: From Popular Literature to the Culture Industry (also Comparative Literature 491 and Society for the Humanities 491) #
Fall. 4 credits. For advanced undergraduates and graduate students; taught in English. Reading knowledge of German required. Not offered 1992–93.
P. U. Hohendahl.]

[GERST 495 The Aesthetic Theory of the Frankfurt School (also Comparative Literature 495)
Spring. 4 credits. Not offered 1992–93.
P. U. Hohendahl.]

[GERST 497/697 The Hermeneutic Tradition (also Comparative Literature 497/697) #
Fall. 4 credits. Not offered 1992–93.
Staff.]

[GERST 498 German Literature in Exile
Fall. 4 credits. Taught in German. Not offered 1992–93.
L. M. Olschner.]

Seminars

Note: For complete descriptions of courses numbered 600 or above consult the appropriate instructor.

[GERST 605 Introduction to Modern German Literary Theory with an Emphasis on Contemporary Criticism (also Comparative Literature 605)
Fall. 4 credits. Not offered 1992–93.
P. U. Hohendahl.]

[GERST 611 Seminar in Old Icelandic Literature I (also English 602)
Not offered 1992–93.]

[GERST 612 Seminar in Old Icelandic Literature II (also English 612)
Not offered 1992–93.]

[GERST 621 Issues in Gay and Lesbian Studies (also Women's Studies 621)
Fall. 4 credits. Not offered 1992–93.
B. Martin.]

GERST 623 Seminar in Medieval German Literature I
Fall. 4 credits.
A. Groos.
Topic: Epic Orientalism. Medieval constructions of otherness make extensive use of what has come to be called orientalism. Using recent studies as a point of departure (Said, Le Goff, and others), our discussions will examine four centuries of medieval orientalizing epics: representations of Attila and the Huns (*Waltharius* and *Nibelungenlied*), differing responses to a century of crusading warfare in the representation of Christian-Moslem enmity (*Rolandslied* and *König Rother*), the reinscription of Germanic heroic epic by high medieval piety (*Kudrun*), and Wolfram von Eschenbach's attempt to subvert the genre tradition of crusading epic as well as orientalism itself in *Willehalm*.

[GERST 624 Seminar in Medieval German Literature II
Spring. 4 credits. Not offered 1992–93.
A. Groos.]

[GERST 625 The Northern Renaissance and Reformation
Spring. 4 credits. Not offered 1992–93.
S. L. Gilman.]

[GERST 626 Nuremberg
Spring. 4 credits. Prerequisite: prermission of instructor. Not offered 1992–93.
A. Groos.]

GERST 627 Baroque
Fall. 4 credits.
P. U. Hohendahl.
The seminar will focus on the development of German literature from 1620 to 1700 with an emphasis on its critical and historical assessment. The readings will stress the special nature of the Baroque period, i.e., its political and social structure, as well as its major religious and aesthetic tendencies, as a transition from feudalism to early absolutism. The discussion will highlight the role of the poet, the function of literature, and the composition of the audience. All major genres (poetry, drama, novel) will be examined. Among the authors to be read will be Fleming, Grimmelshausen, Gryphius, Hofmannswaldau, Opitz, and Zigler.

[GERST 629 The Enlightenment
Fall. 4 credits. Not offered 1992–93.
P. U. Hohendahl.]

[GERST 630 Classicism and Idealism
Spring. 4 credits. Texts in German, discussion in English. Not offered 1992–93.
G. Waite.]

[GERST 631 Sturm und Drang: Construction of the Body and Mind in Late Eighteenth-Century German Literature and Culture
Spring. 4 credits. Not offered 1992–93.
S. L. Gilman.]

[GERST 632 Faust
Fall. 4 credits. Prerequisite: permission of instructor. Not offered 1992–93.
G. Waite.]

[GERST 633 Hölderlin (also Comparative Literature 633)
Spring. 4 credits. Conducted primarily in English, most texts in German; good reading knowledge of French useful, not required. Not offered 1992–93.
G. Waite.]

[GERST 635 The Gates to Modernity: From Karlsbad to the 1848 Revolution (also History 635)
Spring. 4 credits. Anchor course. Not offered 1992–93.
P. U. Hohendahl.]

[GERST 636 Seminar on Richard Wagner (also Music 678)
Not offered 1992–93.]

[GERST 638 Nineteenth-Century Poetry
Not offered 1992–93.]

[GERST 639 German Poetry of the Twentieth Century
Spring. 4 credits. Not offered 1992–93.
L. M. Olschner.]

[GERST 641 The Modern German Novel
Not offered 1992–93.]

[GERST 643 Mann and Myth
Fall. 4 credits. Prerequisite: permission of instructor. Not offered 1992–93.
I. Ezergailis.]

[GERST 644 The Holocaust Survivor as Author (also Near Eastern Studies 444)
For description, see German Studies 444. Not offered 1992–93.]

[GERST 645 West German Literature, 1945–1970
Spring. 4 credits. Open to advanced undergraduates with permission of instructor. Taught in German. Not offered 1992–93.
L. M. Olschner.]

[GERST 646 East German Novel of the Seventies and Eighties
Fall. 4 credits. Not offered 1992–93.
D. Bathrick.]

[GERST 647 German Literature from 1949 to 1989: Questions About Identity
Fall. 4 credits. Not offered 1992–93.
D. Bathrick.]

[GERST 648 East and West German Drama: Post-1945 (also Theatre Arts 438/648)
For description, see German Studies 438. Not offered 1992–93.]

[GERST 649 Contemporary German Women Writers
Not offered 1992–93.]

[GERST 650 Culture in the Weimar Period (also Theatre Arts 650)
Spring. 4 credits. Not offered 1992–93.
D. Bathrick.]

[GERST 660 Visual Ideology (also Comparative Literature 660 and Theatre Arts 660)
Spring. 4 credits. Not offered 1992–93.
G. Waite.]

[GERST 663 Nietzsche (also Comparative Literature 663)
Fall. 4 credits. The seminar is conducted in English; texts are in German and also (when possible) in English translation. Not offered 1992–93.
G. Waite.]

GERST 664 Late Nineteenth Century: Masochism, Externalization, and Identity Formation at the Fin de Siècle
Spring. 4 credits.
S. L. Gilman.
The anchor course will focus on patterns of identity formation in Germany and Austria from 1880 to 1914. Texts from the literary, philosophical, political, and cultural spheres will be examined to analyze the patterns of identity formation in two different cultures (the new German Empire and the collapsing

Royal and imperial Empire of Austro-Hungary). Special attention will be given to the question of Jewish and gay identity at the fin de siècle. Exemplary problems of identity formation and their articulation in texts will be taken from the works of Friedrich Nietzsche, Leopold Sacher-Masoch, Bertha Pappenheim, Sigmund Freud, Arthur Schnitzler, Karen Horney, Ellen Key, Otto Weininger, John Henry Mackay. Critical literature will include writings of a range of contemporary critics.

[GERST 665 The Search for German Cultural Identity, 1850–1920
Spring. 4 credits. Not offered 1992–93.
P. U. Hohendahl.]

GERST 673 Franz Kafka and the Problem of "Minor" Literature (also Comparative Literature 673)
Fall. 4 credits. Reading knowledge of German essential.
S. L. Gilman.
This seminar will serve as an introduction to the study of cultural difference and the problem of a "minor" literature. Its initial focus will be the life and writings of Franz Kafka, but it will examine them in the context of the multicultural world of Prague culture. Central to its focus will be three aspects of Kafka's world: illness, "racial" identity, and sexuality. The interrelatedness of these three fields will be examined through a reading of a selection of Kafka's fictional works in conjunction with his diaries. Parallel readings will consist of selections from the fin-de-siècle medical literature on tuberculosis and "race," on sexuality (especially the world of Christian Ehrenfels), on "racial" politics (Tomás Masaryk on the "blood libel," fin-de-siècle Zionist as well as Yiddish Socialist ['Bundist'] writing) and from the Czech literature (Malena Jesenská, Jaroslav Hasek) as well as German literature (Max Brod, Karl Kraus, which helped form Kafka's literary world. The second half of the semester will focus on echoes of the problem of Kafka and the meaning of a minor literature today. The first readings will encompass direct answers to Kafka such as Phillips Roth's and Nadine Gordimer's answers to Kafka's letter to his father. We will then turn to contemporary writings by Jews and Turks in Germany, which reflect on many of the same questions of seeing oneself as marginal to the literary culture. Readings will include works by Esther Dischereit, Raphael Seligmann, Irene Dische, Maxim Biller, and Aras Ören.

GERST 675 After the Divide: German Critical Theory of the Seventies and Eighties (also Comparative Literature 675 and History 675)
Fall. 4 credits.
P. U. Hohendahl.
The death of Theodor W. Adorno in 1969 marked the end of classical Critical Theory. During the following decade his students and disciples moved in different and conflicting directions. In this country only the project of Jürgen Habermas has received serious and consistent attention. However, the German configuration of the 1980s is considerably more complex. The seminar examines the writings of H. M. Enzensberger, Habermas, O. Negt, A. Kluge, P. Bürger, A. Wellmer, and C. Dahlhaus. Their works range from social and political theory to aesthetic theory and literary and music criticism.

[GERST 676 New German Cinema (also Theatre Arts 676)
Spring. 4 credits. Not offered 1992–93.
D. Bathrick.]

[GERST 677 Mozart (also Music 677)
Fall. 4 credits. Not offered 1992–93.
N. Zaslaw.]

[GERST 678 Theory and Practice of Modern Drama (also Theatre Arts 678)
Spring. 4 credits. Not offered 1992–93.
D. Bathrick.]

GERST 679 Bertolt Brecht in Context (also Comparative Literature 679 and Theatre Arts 679)
Spring. 4 credits. Requirements: seminar paper that will form the basis for an oral presentation for class discussion. Open to qualified undergraduates.
D. Bathrick.
Brecht's theory and dramatic praxis will be examined in the light of a two-fold context: (1) the relation of selected plays and writings to the historical contingencies of the Weimar and exile periods in which they emerged; (2) in later periods: an analysis of the reception and various readings (post-modernism, feminism, post-structuralism) of these same works by later writers and critical publics in Germany and the United States as a way of understanding the changing nature of aesthetic values in the postwar period. Special attention will be given to the importance of Marxism for Brecht's art, as well as to the author's role as a representative of the cultural avant-garde.

[GERST 684 Heidegger: A Reading of *Being and Time*
Not offered 1992–93.]

[GERST 685 Gramsci and Cultural Politics (also Comparative Literature 685 and Government 675)
Spring. 4 credits. Not offered 1992–93.
G. Waite.]

[GERST 688 Theodor W. Adorno: Mass Culture and the Avant-Garde (also Comparative Literature 688 and Theatre Arts 688)
Fall. 4 credits. Not offered 1992–93.
P. U. Hohendahl.]

[GERST 689 Art and Truth: The Aesthetic Theory of Theodor W. Adorno (also Comparative Literature 689)
Spring. 4 credits. Not offered 1992–93.
P. U. Hohendahl.]

[GERST 690 Feminist Criticism and Theory (also Women's Studies 690)
Spring. 4 credits. Open to qualified undergraduates with permission of instructor. Reading knowledge of German required. Not offered 1992–93.
B. Martin.]

GERST 692 The Politics of Criticism (also Comparative Literature 692 and Theatre Arts 692)
Fall. 4 credits.
D. Bathrick.
This course will offer an introduction to the recent debates within the area of literature and cultural studies around such subjects as canonicity and textuality, ethnic and minority studies, feminist and gender studies, literary interpretation, the role of theory, historical scholarshp, interdisciplinary and cultural studies, and the role of the intellectual within the university. While close attention will be paid to evaluating critically individual methodological approaches (new criticism, post-structuralism, Marxism, feminist theory, New Historicism, etc.), of primary concern will be to focus on the conflicting philosophical, political, and institutional controversies that have emerged within the humanities concerning the future direction of the field as a whole. In focusing upon debates rather than the explication of individual theories, we shall seek to situate the evolution of critical discourses within the historical framework of social and institutional changes occuring since the early 1960s.

[GERST 694 Seminar in Literary Theory: Aesthetics of Reception and Reader Response Theory (also Comparative Literature 694)
Fall. 4 credits. Not offered 1992–93.
P. U. Hohendahl.]

[GERST 695 Brecht and Artaud (also Comparative Literature 695 and Theatre Arts 695)
Fall. 4 credits. Not offered 1992–93.
D. Bathrick.]

[GERST 697 The Hermeneutic Tradition (also Comparative Literature 497/697)
Not offered 1992–93.
For description, see German Studies 497.]

[GERST 699 German Film Theory (also Comparative Literature 699 and Theatre Arts 699)
Spring. 4 credits: Not offered 1992–93.
D. Bathrick.]

GERST 710 Research Methods in Medieval Literature
Spring. 4 credits. Prerequisite: permission of instructor.
A. Groos.
The course will present an introduction to a variety of non-literary discourses that appear in medieval narratives, beginning with a survey and research problems in Biblical exegesis, mythography, the liturgy, and general encyclopaedic lore, as well as a variety of more specialized topics. The second half of the course will investigate problems in the use of scientific discourses in literary texts, using as examples the *Roman de la Rose* and *Franklin's Tale*. Depending on class interest, we will also examine topics such as astronomy and astrology, alchemy, or constructions of gender in medicinal and gynecological treatises.

GERST 753-754 Tutorial in German Literature
Fall and spring. 1–4 credits per term.
Prerequisite: permission of instructor.
Hours to be arranged. Staff.

Related Courses in Other Departments

Government

GOVT 376 Rethinking Marx
Fall.
S. Buck-Morss.

GOVT 380 Politics of German Reunification
Fall.
M. Minkenberg.

GOVT 400.2 German Unification in a Changing Europe
Spring.
M. Minkenberg.

Modern Languages and Linguistics

GERLA 407 Teaching German as a Foreign Language
Fall or spring.
Staff.

GERLA 611 Readings in Old High German and Old Saxon
Spring.
J. H. Jasanoff.

GOVERNMENT

V. Shue, chair; B. R. O'G. Anderson, M. G. Bernal, S. Buck-Morss, V. Bunce, B. Ginsberg, J. Goldgeier, R. Herring, N. Hirschmann, S. I. Jackson, M. Katzenstein, P. Katzenstein, E. W. Kelley, E. G. Kenworthy, J. Kirshner, I. Kramnick, R. N. Lebow, T. J. Lowi, W. Mebane, T. J. Pempel, J. Pontusson, J. Rabkin, A. Rutten, L. Scheinman, M. Shefter, S. G. Tarrow, S. Telhami, N. T. Uphoff

Government is what Cornell calls a department that elsewhere might be termed political science. The focus of this discipline is power applied to public purposes. Some faculty concentrate on purposes, some on applications. Some engage in the close reading of great texts of political philosophy, while others analyze the behavior of power-wielders and publics in this and other societies. Government is divided into four subfields: U. S. politics, comparative politics (other nations), political theory (philosophy), and international relations (transactions between nations).

To accommodate new courses or course changes, a supplementary announcement is prepared by the department. Before enrolling in courses or registering each term, students are requested to consult the current supplement listing courses in government, available in 125 McGraw Hall.

The Major

To be **admitted** to the major, a student must have already received a passing grade in at least three government department courses and received a grade of B or better in at least two such courses.

To **complete** a major in government, a student must (1) pass at least two of the introductory courses and an additional course in one of the remaining government subfields (American Government, Comparative Government, Political Theory, International Relations); (2) accumulate an additional 24 credits of government coursework at the 300-level or above; (3) successfully complete at least one seminar-style course in government (which may be applied toward the 24 credits); (4) accumulate at least 16 credits in related fields, again at the 300 level or above. All courses used to fulfill a government major must be passed with a letter grade. Majors are urged to complete the introductory course requirement early.

Seminars are those courses numbered 400, 494, and 500, plus whatever additional courses the director of undergraduate studies may designate. To be admitted to a seminar, students apply during the course scheduling period held the previous semester. Related fields normally include courses offered by these departments: Anthropology, Economics, History, Psychology, and Sociology. Majors should discuss their selection of related courses with their advisers. When approved by an adviser or by the director of undergraduate studies, courses from still other departments may be used to fulfill this requirement.

Cornell-in-Washington Program. Government majors may apply to the Cornell-in-Washington program to take courses and undertake a closely supervised externship during a fall or spring semester.

European Studies Concentration. Government majors may elect to group some of their required and optional courses in the area of European studies, drawing from a wide variety of courses in relevant departments. Students are invited to consult Professors P. Katzenstein, Scheinman, and Tarrow for advice on course selection and foreign study programs.

Model European Community Simulation. Undergraduates with an interest in the European Community, public affairs, or debating may participate in the annual Modern European Community Simulation (SUNYMEC) held in April at SUNY Brockport. The simulation is an opportunity for participants, representing politicians from the member nations of the European Community, to discuss issues and resolutions of current concern to the EC.

To prepare for this simulation, a 2-credit independent study seminar is offered each spring. Participation in the simulation will be open only to those who register for this seminar. Anyone interested in participating or in finding out more information should contact the Western Societies Program at 130 Uris Hall, 255–7592.

International Relations Concentration. See the description under "Special Programs and Interdisciplinary Studies."

Honors. Each fall a small number of seniors enter the honors program. To apply, junior majors submit applications in May. Along with a fuller description of the honors program, application forms are available in 125 McGraw Hall. The two courses comprising the honors sequence (honors courses) are described below.

Introductory Courses

Students registering for introductory courses should register for the lecture only. Sections will be assigned during the first week of class. Introductory courses are also offered during summer session.

GOVT 111 The Government of the United States
Spring and summer. 3 credits.
B. Ginsberg, T. J. Lowi.
An introduction to government through the American experience. Concentration on analysis of the institutions of government and politics as mechanisms of social control.

GOVT 131 Introduction to Comparative Government and Politics
Fall and summer. 3 credits.
J. Pontusson.
This course provides a survey of the institutions, political processes, and policies of contemporary states. It focuses on the conditions for and workings of democracy. Looking at Western Europe, we will analyze institutional variations among liberal democracies, and their political implications. We will then probe the origins of democracy in Western societies and the reasons why communism and other forms of authoritarian rule have prevailed elsewhere. Finally, we will explore the impetus behind and the obstacles to democratization in the Third World and the erstwhile Communist Bloc. Throughout this survey, problems of democracy will be related to problems of economic development, efficiency, and equality.

GOVT 161 Introduction to Political Theory
Spring and summer. 3 credits.
I. Kramnick.
A survey of the development of Western political theory from Plato to the present. Readings from the works of the major theorists. An examination of the relevance of their ideas to contemporary politics.

GOVT 281 Introduction to International Relations
Fall and summer. 4 credits.
P. Katzenstein.
An introduction to the basic concepts and practice of international politics.

Freshman Writing Seminars

GOVT 100 Freshman Seminars
Fall, spring, or summer. 3 credits. Seminars will be offered in fall, spring, and summer terms. Consult the listings for the Freshman Seminar Program in the section "Special Programs and Interdisciplinary Studies," the supplement issued by the department, and the Freshman Seminar booklet for course descriptions and instructors.

Major Seminars

GOVT 400 Major Seminars
Fall or spring. 4 credits.
These seminars, emphasizing important controversies in the discipline, cap the majors' experience. Thus preference in admission is given majors over nonmajors and seniors over juniors. Topics and instructors change each semester. To apply, students should pick up a form in 125 McGraw Hall during the course selection period the semester before the seminar is given. The following courses are open to sophomores, juniors, and seniors without prerequisites unless otherwise indicated.

American Government and Institutions

Government 111 is recommended.

GOVT 302 Social Movements in American Politics
Spring. 4 credits.
E. Sanders.
From populism to environmentalism, social movements directed at reform of national policies and political structures have been an earmark of American politics. This course will begin with an examination of late nineteenth-century agrarian and labor movements and move through progressivism, a variety of 1930s upsurges, civil rights, and more or less contemporary environmental, consumer, feminist, and peace movements. The focus will be on the conditions that gave rise to

these movements, their internal resources and external alliances and their ultimate impact on the national state (as well as vice versa).

GOVT 310 Power and Poverty in America
Fall. 4 credits.
E. W. Kelley.
Despite egalitarian democratic rights, the United States remains a stratified society conspicuous for great disparities in the allocation of income and wealth. The purpose of this class is to investigate these disparities, both empirically and normatively, and to assess the impact of government upon them. Topics for discussion will include: What do we mean by distributional inequality and by the demand for greater egalitarianism? What is the extent of inequality and of poverty in America today? How does one establish minimum standards for distributional justice? Is the United States currently on the road toward achieving that minimum standard? What is the array of federal welfare programs presently available and what is their effect? What reforms are currently on the political agenda? Can we imagine a society somewhat like that in America achieving a very different distribution of educational and occupational outcomes as described by race, income class, and language spoken by parents?

GOVT 311 Urban Politics
Spring. 4 credits.
M. Shefter.
The interaction between urban problems and the politics of city government has resulted in important public policy issues in the United States. This course provides an introduction to the politics of metropolitan areas; analysis of the central institutions and processes of urban government such as mayors, city councils, elections, and the criminal justice system; and specific public policy problem areas such as race relations, education, housing, law enforcement, and civil disorder.

GOVT 313 The Nature, Functions, and Limits of Law
Spring. 4 credits.
J. J. Barceló, K. M. Clermont, and R. A. Hillman.
A general education course for students at the sophomore and higher levels. Law is presented not as a body of rules but as a set of varied techniques for resolving conflicts and dealing with social problems. The roles of courts, legislatures, and administrative agencies in the legal process is analyzed, considering also the constitutional limits on their power and practical limits on their effectiveness. Readings consist mainly of judicial and administrative decisions, statutes and rules, and commentaries on the legal process.

[GOVT 314 Freedom of Expression
4 credits. Not offered 1992–93.]

GOVT 316 The American Presidency
Fall. 4 credits.
E. Sanders.
Analysis of the politics of the presidency and the executive branch with emphasis on executive-legislative relations, executive branch policymaking, and the problems of the modern presidency.

GOVT 317 Campaigns and Elections
Fall. 4 credits. Prerequisite: Government 111 or permission of the instructor.
W. Mebane.
This course examines campaigns and elections, focusing primarily on national elections in the United States. Topics include the relationship between elections and the economy, the weakness of the American party system, voter turnout, individual voting decisions, negative campaigning, and the noncompetitiveness of congressional elections. We examine several theories that explain these phenomena, including in particular the theory of rational choice. Course requirements include one or two papers based on original analysis of election survey data.

GOVT 318 The American Congress
Fall. 4 credits.
M. Shefter.
The role of Congress in the American political system. Topics to be discussed: the political setting within which Congress operates, the structure of Congress, the salient features of the legislative process, and recent congressional behavior in a number of policy areas.

[GOVT 320 Public Opinion and Public Choice
4 credits. Not offered 1992–93.]

[GOVT 323 The "Fourth" Branch
4 credits. Not offered 1992–93.]

GOVT 324 Legal Reasoning and Legal Adaptation: A Comparison of American and Talmudic Law
Fall. 4 credits.
J. Rabkin.
Legislatures may change old laws to reflect new preferences, but much American law is still adapted to modern challenges by judges invoking old precedents and principles, particularly in fields like family law, the law of contracts, and the law of torts. Talmudic law, which rests on much older principles and precepts and cannot fall back on new legislation to justify change in the modern world, must also be adapted to new circumstances. The rabbinic authorities who seek to apply this law often invoke similar kinds of reasoning as American courts but under peculiar constraints. This course, an unusual venture in comparative law, will focus on characteristic modes of reasoning in each system, rather than attempting any systematic surveys of legal outcomes. Readings will include selections from ancient texts as well as modern decisions and contemporary commentaries. No previous background is required.

GOVT 327 Civil Liberties in the United States
Spring. 4 credits.
A. Rutten.
An analysis of contemporary issues in civil liberties and civil rights, with emphasis on Supreme Court decisions. Cases are analyzed in terms of democratic theory and the social and political context in which they arose.

[GOVT 328 Constitutional Politics: The United States Supreme Court
4 credits. Not offered 1992–93.]

GOVT 353 Feminism, the State, and Public Policy (also Women's Studies 353)
Spring. 4 credits. Permission of the instructor only. Students seeking admission to the course *must* attend first class of the semester.
M. Katzenstein.
The course examines the aims and strategies of the feminist movement in the United States and the response of both society and the state to feminist claims. It is thus a course about political protest and the capacity of American political institutions to promote and shape as well as to counter social change. In examining the law and public policy on such issues as job discrimination, wife battery, rape, abortion, etc., the course explores the contradictions between, and the congruence of, the dual ideals of individual choice and group equality.

GOVT 404 American Political Development in the 20th Century
Spring. 4 credits.
E. Sanders.
This course will examine the development of the regulatory, welfare, and national security state in the United States from Roosevelt (T. R.) through Reagan. Employing a political economy perspective, we will analyze how state-expanding and contracting laws came to be passed and the changing role of the president, courts, and bureaucracy in their design and enforcement. The profound uneasiness of America about expansion of national government power and alternative methods for controlling Leviathan will be a continuing theme.

[GOVT 405 Government and the Economy
4 credits. Not offered 1992–93.]

GOVT 406 Politics of Education
Spring. 4 credits.
E. W. Kelley.
Education is simultaneously American's biggest business and the institutional process through which skills and values are passed on to the next generation. This course deals with conflicts about, and the politics of, education as they occur at national, state, and local levels. What (including values) will be taught and to whom; who will benefit from formal education as a vehicle for entry into economic opportunity? What are the powers and restrictions on government in this area? How does the American system differ from other systems? How does educational testing affect equal opportunity to obtain meaningful competencies and jobs?

GOVT 407 Law, Science, and Public Values
Fall. 4 credits.
S. Jasanoff.
This course explores the varied interactions between science and the legal process that have developed in recent years as a result of attempts to bring greater public accountability to the use of science and technology. It examines the activities of both legislatures and courts in controlling science, and analyzes the values underlying these initiatives. Three major types of science-law interactions form the focus of the course: regulation of new technologies, judicial review of risk management decisions, and legal control of professional standards in science and technology. Specific topics include the regulation of toxic chemicals and nuclear power, controversies about biotechnology, reproductive technologies and biomedical research, and science fraud.

GOVT 410/610 Democratic Theory and Institutions
Fall. 4 credits.
A. Rutten.
Courts play a central role in the formulation and enforcement of policy in the United States. However, courts are not all powerful; politicians and bureaucrats have a variety of

ways of changing judicial decisions. This course examines judicial control over policy by examining the relations among politicians, bureaucrats, and judges. To do so, we must examine how courts fit into the political process. Among the topics that we will consider are statutory interpretation, administrative procedures, and constitutional review.

GOVT 412 Voting and Political Participation
Spring. 4 credits.
K. Abrams.
This course will explore the meanings assigned to political participation in the American political system and examine a series of instances in which the law has been used to enhance, equalize, or otherwise regulate voting and other forms of political participation. The course will begin by investigating the problematic rationality of political participation, examining several arguments for participation notwithstanding the low probability that any participant's vote will have an effect on electoral outcomes. We will then use a brief survey of historical and contemporary denials of the franchise to shed further light on the meaning(s) of political participation. The second part of the course will turn to the question of legal regulation of the vote, examining the merits and proper scope of plebiscitary democracy; the problem of apportionment resolved and created by the "one persons, one vote" rule; and efforts to facilitate minority political participation under the Constitution and the Voting Rights Act. Some previous experience with legal materials (case studies, statutes) will be helpful, but is not required.

GOVT 413/613 Politics and Economics in Local Areas
Spring. 4 credits. Prerequisites for undergraduates: Government 111 and one 300-level course in American government, or permission of the instructor.
W. Mebane.
"All politics is local politics," some say. This course gives sustained attention to that proposition. We examine how political outcomes in the United States depend on local economic conditions, and vice versa. Fiscal federalism, the distributive and economic consequences of taxing and spending, the pork barrel, and the effects local economic conditions have on elections are among the topics considered. A key theme is that the U.S. Congress, with its strong ties to local areas, is the heart of American government. Whether this is good or bad turns out to be a serious and difficult question. This course is a research seminar. In addition to covering the relevant literature, students are expected to complete a substantial paper based on original quantitative analysis of field research.

[GOVT 414/614 The Administrative State
4 credits. Not offered 1992–93.]

[GOVT 424 Political Change in the United States
4 credits. Not offered 1992–93.]

[GOVT 427 Environment and Public Policy
4 credits. Not offered 1992–93.]

GOVT 428–429 Government and Public Policy: An Introduction to Analysis and Criticism
428, fall; 429, spring. 4 credits each term. Open to undergraduates. 428 and consent of instructor are required for 429.
T. J. Lowi.
Government 428 concentrates on history and criticism of U.S. policies and the politics associated with them. Particular attention is given to the origins and character of the regulatory state and the welfare state. Government 429 is an opportunity to pursue further the research begun in 428.

Comparative Government

Government 131 is recommended.

GOVT 271 Introduction to African Development (also CRP 271 and ASRC 271)
Spring. 3 credits.
N. Uphoff and staff.
A survey of development problems in Sub-Saharan Africa, including the importance of the natural resource base, the policy and institutional factors affecting development, and the human resource potential in the continent.

GOVT 325 Eastern Europe
Spring. 4 credits.
V. Bunce.
This course will provide an introduction to the domestic and international politics of Eastern Europe. We will concentrate, first, on the historical development of this region before World War II. We will then turn to an analysis of communist revolutions and the construction of the socialist order in Eastern Europe. We will close the course with an analysis of the collapse of communist party rule in 1989 and the prospects for capitalism and liberal democracy.

[GOVT 330 The Soviet Union: Politics, Economics, and Culture (also Russian Literature 330 and Economics 330)
4 credits. Not offered 1992–93.]

[GOVT 333 Government and Politics of the Former Soviet Union
4 credits. Not offered 1992–93.]

[GOVT 334 Business and Labor in Politics
4 credits. Not offered 1992–93.]

GOVT 335 America in the World
Fall. 4 credits. Permission of instructor required.
M. Bernal.
Most studies of America deal either with local or autochthonous developments up to 1492 or with the influences of other continents, notably Europe, on "the New World" after that date. In this course we shall look at the other sides of these pictures and consider contacts between America and the other continents of Asia, Europe, and Africa before Columbus, as well as some of the influences of America on the rest of the world after his arrival.

The course will involve discussions with professors from archaeology, anthropology, and classics on the possibilities of PreColumbian contacts.

[GOVT 336 Politics of Ethnic Pluralism in Europe/Canada
4 credits. Not offered 1992–93.]

[GOVT 337 Marxism, Communism, and Revolution
4 credits. Not offered 1992–93.]

[GOVT 338/638 European Political Development
4 credits. Not offered 1992–93.]

[GOVT 340 Latin American Politics
4 credits. Not offered 1992–93.]

[GOVT 341 Society and Politics in Central Europe
4 credits. Not offered 1992–93.]

GOVT 342 The New Europe
Fall. 4 credits.
J. Pontusson, P. Katzenstein.
This course will explore the development of the European Community and its "1992" program. The course will deal with community institutions and policies, but it will also address the consequences of integration for individual countries, and the domestic politics of 1992. The methods and theoretical concerns of comparative as well as international political economy will thus be brought to bear on current issues.

[GOVT 343 Contemporary European Society and Politics (also History 283 and German Literature 283)
4 credits. Not offered 1992–93.]

GOVT 344 Government and Politics of Southeast Asia
Fall. 4 credits.
B. Anderson.
The course will focus on the comparative analysis of the nature and origins of political conflict in selected Southeast Asian nation-states. Particular attention will be given to nationalism/ethnicity, religion, and class, as well as to the differential impact of colonial rule.

GOVT 345 Modern European Politics
Spring. 4 credits.
M. Minkenberg.
This course wants to introduce students to the political systems of Western Europe, to help gain a better understanding of the political system of the United States through comparative analysis, and to familiarize students with some of the concepts used for the comparative analysis of political systems.

[GOVT 346 Politics of Contemporary Japan
4 credits. Not offered 1992–93.]

GOVT 347 Government and Politics of China
Fall. 4 credits. No prerequisites.
V. Shue.
An introduction to the main currents in China's domestic politics over the last fifty years. Topics include Maoist philosophy; the Communist Party's revolutionary rise to power; peasants, communes, and village politics; ultra-left socialist idealism and mass mobilization; intra-bureaucratic politics; the conditions for military and industrial modernization; and the recent turn toward "market socialism."

[GOVT 348 Politics of Industrial Societies
4 credits. Not offered 1992–93.]

GOVT 349 Political Role of the Military
Spring. 4 credits.
B. Anderson.
Comparative study of the political consequences of the global spread since the early nineteenth century, of professionally officered, industrially equipped militaries. Case studies of selected European, Asian, African, and American states will investigate the relationships of these militaries to nationalism, imperialism, technological innovation, and munitions industries, as well as class, ethnic,

and religious conflict. Particular attention will be paid to the peculiarities of the modern military's organizational structure in shaping its political roles.

GOVT 350 Comparative Revolutions
Spring. 4 credits.
S. Tarrow.
A comparative study of the great modern revolutions seen as social movements, from the French and American revolutions of the eighteenth century to the Russian and Chinese revolutions of the twentieth century, ending with a consideration of the recent "velvet" revolutions in Eastern Europe. Attention is given to the international context internal political opportunity structures which turn revolt and rebellion into revolution.

GOVT 351 India: Social and Economic Change in a Democratic Polity
Fall. 4 credits.
M. Katzenstein.
This course explores the social, economic, and political forces that have shaped India's development since independence. It considers why democratic political institutions in India have proved so resilient and what effect these institutions have on the economic and social policies that are pursued. The importance of international as well as domestic forces in shaping India's economic and political choices is also assessed.

[GOVT 352 Topics in the Middle East: Islam and the State in the Middle East (also Near Eastern Studies 397)
4 credits. Not offered 1992–93.]

[GOVT 354 America in the World Economy
4 credits. Not offered 1992–93.]

[GOVT 356 Elites and Society: The Political Economy of Power
4 credits. Not offered 1992–93.]

[GOVT 357 Political Development in Western Europe
4 credits. Not offered 1992–93.]

[GOVT 358 Modern History of the Middle East: Changing Politics, Society, and Ideas (also Near Eastern Studies 294)
4 credits. Not offered 1992–93.]

[GOVT 359 Soviet Foreign Policy
4 credits. Not offered 1992–93.]

[GOVT 365 Social Movements and Politics in Industrial Societies
4 credits. Not offered 1992–93.]

[GOVT 430 The Politics of Productivity: Germany and Japan
4 credits. Not offered 1992–93.]

[GOVT 431 Political Economy of Japan
4 credits. Not offered 1992–93.]

[GOVT 435 Collective Action and Politics in Modern Europe (also History 435)
4 credits. Not offered 1992–93.]

GOVT 436 Environmental Politics and Policy
Spring. 4 credits.
R. Herring.
A research seminar oriented toward theoretical understanding of the intersection of social and natural systems as mediated by the state. Readings and examples will come from both rich and poor societies. Specific topics will include the "tragedy of the commons," biodiversity, international accords affecting the environment and various models of political behavior and the translation of political movements into public law.

GOVT 439 Problems of Ethnicity, Religion, and Interest: Russia, Central Asia, and the Middle East (also Near Eastern Studies and Religious Studies 493)
Fall. credits.
G. Golan.
The seminar will examine the impact of the breakup of the Soviet Union and the domestic issues affecting policies toward the Middle East from Turkey to the Persian Gulf. Particular attention will be given to the role of Islam and ethnicity in the newly independent Muslim states, as well as Russia, in the interplay between these factors and the economic, political, and defense interests of these states.

GOVT 443/643 Socialism and the Market in China
Spring. 4 credits.
V. Shue.
What are the problems and benefits of China's recent wide-ranging experiments with free market reform? Can the legacies of Maoist socialism be made compatible with a market-based economy and rapid "modernization"? Readings, research, and seminar discussion; open to students with at least some previous course work on contemporary Chinese society, politics, or economy.

[GOVT 446 Comparative Communism
4 credits. Not offered 1992–93.]

[GOVT 449 State Institutions and Social Coalitions
Not offered 1992–93.]

[GOVT 450 U.S. Foreign Policy and Latin America
Not offered 1992–93.]

[GOVT 453 The Fabrication of Ancient Greece, 1780–1880
4 credits. Not offered 1992–93.]

GOVT 454 The Herodotean Moment: The Uses and Abuses of "Western Civilization" (also Comparative Literature 454, History 454)
Fall. 4 credits. Prerequisite: permission of instructor.
M. Bernal.
The basic premise of the seminar is that the concept of Western civilization is a problematic one in need of critical analysis. The course will examine the historical evolution of the concept as seen in selected moments of actual and perceptual encounters with other civilizations. It will also inquire into the political uses and abuses of the concept, as well as its discursive, psychological, and anthropological dimensions.

[GOVT 457 Comparative Public Law: Legal Controls on Government in Europe and America
4 credits. Not offered 1992–93.]

[GOVT 460 Peasant Politics
4 credits. Not offered 1992–93.]

Political Theory

Government 161 is recommended.

[GOVT 360 Ancient Greek Constitutions (also Classics 340)
4 credits. Not offered 1992–93.]

GOVT 361 Modern Ideologies: Liberalism and Its Critics
Fall. 4 credits.
I. Kramnick.
Since the rise of capitalism, one political ideology has been dominant in the Western world—liberalism. However, its hegemony has been questioned by a series of critics: democracy, socialism, anarchism, conservatism, Freudianism, and feminism. This course will study the tensions between liberalism and these critics and speculate on the possible survival or extinction of this venerable and very American ideology.

GOVT 364 Individual and Community in Modern Political Thought
Spring. 4 credits.
N. Hirschmann.
This course will focus on the relation of the individual to community in modern political thought. In one of two major theoretical traditions to be explored—"liberalism"—the individual is defined in contrast to society. Liberal theories define freedom as the absence of external obstacles and construct governmental authority as an impartial "umpire" to mediate between individuals' conflicting desires. In the "communitarian" tradition, in contrast, individual and society are seen as subsumed in one another, completely identical in interests and goals. Government is seen as a collective, participatory enterprise, where consensus can and must be reached, and freedom is linked to the community's ability to pass "good" laws. We will explore the tensions within and between these two models, considering issues of self and other, knowledge and perspective, politics and meaning, from Hobbes through contemporary feminism.

GOVT 368 Global Climate and Global Justice
Fall. 4 credits.
H. Shue.
Attempts to organize international cooperation to prevent fundamental changes in global climate, like ozone destruction and global warming, have produced disputes between rich states and poor states about who should bear which proportion of the costs of the necessary economic changes. What is fair when rich and poor cooperate to deal with a common threat? This course critically examines liberal, communitarian, feminist, and Third-World views. Readings includes J. Rawls, *A Theory of Justice*; B. Barry, *Theories of Justice*; M. Walzer, *Spheres of Justice*; I. M. Young, *Justice and the Politics of Difference*; C. R. Beitz, *Political Theory and International Relations*; A. Hurrell and B. Kingsbury, *The International Politics of the Environment*; and A. Agarwal and S. Narain. *Global Warming in an Unequal World: A Case of Environmental Colonialism.*

GOVT 376 Rethinking Marx
Fall. 4 credits.
S. Buck-Morss.
Marx's writings profoundly influenced a century and a half of political theory and practice, throughout the world. Why were his writings so powerful? What explains the present collapse of that power? We will examine closely the original texts of Marx to uncover its philosophical premises. We will trace historically the impact of Marxism in America, from immigrant labor movements at the turn of the century to the civil rights and student movements of the 1960s. And we will sample the work of political thinkers who, in

their commitment to social justice and their desire to end oppression, have built upon the Marxist philosophical tradition: Water Benjamin, Simone de Beauvoir, Frantz Fanon, C. L. R. James, Herbert Marcuse.

GOVT 463 Politics of Contemporary Feminist Theory
Fall. 4 credits.
N. Hirschmann.
For years the women's movement based its claim to equality on the assertion that men and women are the same. Recently, however, feminist theorists have argued that there are deep, fundamental differences between the sexes: for instance, do women and men view morality differently? What effect does reproduction have on female consciousness? Does women's work produce a particular epistemology, or "way of knowing?" How do gender, race, class, sexual orientation, etc., influence each other? Drawing on works from political science, psychology, sociology, literary criticism, and philosophy, we will examine a variety of contemporary methods and approaches to feminism, paying particular attention to the issue of "difference" and how claims of difference affect women's claims to equality. In the process, we will examine the "politics" of feminist theory, and what feminism has to offer political science as a discipline. Some familiarity with the methods of political theory is recommended, but not required.

GOVT 466 Feminism and Gender Discrimination
Fall. 4 credits.
K. Abrams.
This course will introduce students to the major schools of feminist legal theory, including equality theory, difference theory, dominance theory, and essentialism. It will then use these theories as a framework for examining several areas in which the law has attempted to address gender-specific injuries. These will include the workplace (sexual harassment, regulation of fertility, work/family conflict, the family (abortion, surrogacy), and violence against women (rape, spousal abuse, pornography). The course will emphasize analysis and critique of present political and legal responses and formulation of alternative responses. Some previous exposure to legal materials (case law, statutes) is useful but not required.

[GOVT 469 Limiting War (also Philosophy 369)
4 credits. Not offered 1992–93.]

[GOVT 471 Social Theories of Modernity I
4 credits. Not offered 1992–93.]

[GOVT 472 Social Theories of Modernity II
4 credits. Not offered 1992–93.]

International Relations

Government 181 is recommended.

GOVT 380 The Politics of German Unification
Fall. 4 credits.
M. Minkenberg.
The course aims at elaborating the process of German unification in 1989/90, its structural determinants, and its consequences for the new Germany. The course first reviews the "German question" in historical perspective and examines the political regimes of the separated Germany from 1949 to 1989. It then introduces students to the major dimensions of German unification in terms of the national and international context, the establishment of a democratic regime in the East, the economic restructuring, and the foreign policy implications of the new Germany.

GOVT 381 The Politics of Defense Spending
Fall. 4 credits.
J. Reppy.
An analysis of U.S. military programs and budgets in the post-World War II period. Topics covered will include an overview of the defense budget process, special characteristics of the defense market, behavior of defense firms, and domestic factors shaping the arms race. There will be occasional guest lectures by visitors of the Peace Studies Program.

[GOVT 382 Integration in the World System
4 credits. Not offered 1992–93.]

GOVT 383 Theories of International Relations
Spring. 4 credits. Prerequisite: GOVT 181 or 281.
J. Kirshner.
This course examines some of the main theories in the field of international relations. It will consider a number of particularly important or influential works, along with discussions of methodology, research design, theory formation, and the evolution of the field as a whole. The goals of the course are to identify and criticize the central arguments advanced by different scholars in order to assess the relative merits of competing approaches to the main issues in the field.

GOVT 384 War and Peace in the Nuclear Age (also Physics 206)
Spring. 4 credits.
L. Scheinman.
Intended for students wishing to understand the following: the principles, types, and effects of nuclear weapons; existing and proposed arsenals and delivery systems; the evolution and present state of the nuclear military strategy of the nuclear powers and the history of nuclear arms control negotiations. Additionally, the course will examine critically the important concepts involved in military strategy and arms control, current issues in military posture and arms control negotiations, and the moral and ethical questions involved.

[GOVT 385 Contemporary American Foreign Policy
4 credits. Not offered 1992–93.]

[GOVT 386 Structure and Process in the Global Political Economy
Spring. 4 credits. Not offered 1992–93.]

[GOVT 387 The United States and Asia
4 credits. Not offered 1992–93.]

GOVT 388 International Political Economy
Fall. 4 credits. Prerequisites: Government 181 or 281 and at least one course in economics.
J. Kirshner.
This course examines the politics of international political economic relations. It will draw on the history of the modern international economy and explore the theories that have been used to explain its evolution. The goals of the course are to gain insights into contemporary issues and to understand how scholars of international relations and economics describe and explain problems in the global economy.

[GOVT 389 International Law
4 credits. Not offered 1992–93.]

[GOVT 390 Principles of Strategy
4 credits. Not offered 1992–93.]

GOVT 392 International Relations of the Middle East
Spring. 4 credits.
S. Telhami.
This course will examine patterns of international relations in the Middle East in the twentieth century, with special reference to the Arab-Israel and Iran-Iraq conflicts. These conflicts will be treated as part of a Middle East system, whose other main elements are the interaction between domestic and external politics, inter-Arab relations, and the involvement of extraregional powers.

[GOVT 393 War and Peace in Greece and Rome (also History 266)
4 credits. Not offered 1992–93.]

GOVT 397 The United States and Russia
Spring. 4 credits.
J. Goldgeier.
For more than forty years, the United States and the Soviet Union were engaged in a struggle that dominated world politics. In the aftermath of the 1991 breakup of the USSR, the U.S. is trying to forge a new relationship with Russia. This class examines both the conflict of the Cold War era and looks at U.S. options toward Russia in an era of great uncertainty.

[GOVT 398 The Transformation of International Relations, 1989–
4 credits. Not offered 1992–93.]

GOVT 399 International Relations in the Former Soviet Union
Fall. 4 credits.
J. Goldgeier.
What are the sources of conflict and cooperation among the newly-independent states of the former Soviet Union? This class will use different theories of international relations to study this new laboratory of international politics. Topics include balance-of-power politics, economic interdependence, the rise of nationalism, and nuclear weapons policy. Government 181 or equivalent is recommended.

[GOVT 474 Empires and Imperialism in World Politics
4 credits. Not offered 1992–93.]

GOVT 475 Topics in International Political Economy
Spring. 4 credits.
J. Kirshner.
Government 475 is a topical seminar that focuses on a different aspect of international political economy each time it is offered. The goal of the course is to explore the historical and theoretical background of a particular issue or controversy and consider the implications of that analysis for the contemporary system. In spring 1993 the focus will be on the political economy of international trade.

GOVT 478/681 Accumulation on a World Scale
Spring. 4 credits.
S. Jackson.
In this course, we will examine the political economy of international capital. Capital, in its fixed and financial forms, is both cause and consequence of the accumulation of wealth. Understanding the nature and effects of its movement between countries and its distribution among countries is critical to a broader understanding of the political and economic relations among countries in the contemporary capitalist world economy. Among the particular issues to which we will give special attention are the Third World debt crisis; the shift of the United States from creditor to debtor nation status; the impact of foreign direct investment within the Third World as well as within the advanced industrialized countries; and the role of international banks, including the World Bank and the IMF, in resolving and/or exacerbating contemporary problems in the world economy.

GOVT 479/679 *Dependencia* and the State
Fall. 4 credits.
S. Jackson.
In this course we will examine closely a sampling of the principal theoretical and empirical works that seek to explain the constraints on and possibilities for state action in dependent societies, focusing particularly on those factors arising directly from the location of countries in the global system, including the role of multinational corporations, the World Bank, and military aid.

[GOVT 481 Foreign Policy of the U.S.S.R.
4 credits. Not offered 1992–93.]

[GOVT 483 The Military and New Technology
4 credits. Not offered 1992–93.]

[GOVT 484 Defense Strategy
4 credits. Not offered 1992–93.]

[GOVT 485 International Political Economy
4 credits. Not offered 1992–93.]

[GOVT 487 Chinese Foreign Policy
4 credits. Not offered 1992–93.]

[GOVT 488 Comparative Capitalism
4 credits. Not offered 1992–93.]

GOVT 489 International Law and Regime Development
Fall. 4 credits.
L. Scheinman.
This course examines and analyzes the development, maintenance, and transformation of technological, economic, and security regimes, giving particular emphasis to the role of international law processes and institutions. Monetary, oceanic, and arms control regimes, among others, will be covered in the course.

Honors Courses

Each April a limited number of junior majors are admitted to the honors program, their work to begin the following fall. Application forms and a full description of the program may be obtained in 125 McGraw Hall.

GOVT 494 Honors Thesis Clarification and Research
Fall. 4 credits.
Staff.
Each student works individually with a faculty member. The student initiates the tutorial by interesting a faculty member in his or her likely thesis project and by submitting to the director of undergraduate studies a form outlining the general area the thesis will treat and bearing the faculty tutor's signature. This form is due the third week of classes. The tutorial culminates in a ten-to-fifteen-page paper setting forth the central questions to be addressed by the thesis, the state of existing knowledge regarding those questions, and why they matter.

GOVT 495 Honors Thesis: Research and Writing
Spring. 4 credits. Limited to students who have successfully completed Government 494.
Staff.
Students continue the work of the preceding semester typically with the same faculty tutor. Research on the thesis is completed and writing begun. The tutorial culminates in a thesis of some sixty to eighty pages. The grade for the tutorial is determined by the faculty tutor, while the degree of honors (if any) awarded the thesis is decided by a committee of faculty members established for that purpose.

Supervised Study

Except under very unusual circumstances, supervised study, Government 499, is open only to government majors doing superior work in the major. The application form may be obtained in 125 McGraw Hall and must be approved by the director of undergraduate studies for credit to be granted. There is no limit established for the total number of credits a government major may take in Government 499 while at Cornell, but he or she may count no more than 4 credits toward fulfillment of the major. Students who want to continue taking the course for more than one semester must select a new theme or subject each semester, and applicants must present a well-defined program of study that cannot be satisfied by taking regular courses. Credit can be given only for work that results in a satisfactory amount of writing. Emphasis is on the capacity to subject a body of related readings to analysis and criticism. Permission of the instructor is required.

GOVT 499 Readings Fall or spring.
Fall or spring. 1–4 credits.
Staff.

Graduate Seminars

Qualified undergraduates are encouraged to apply for seminars listed with 600 course numbers but may only register with the permission of the instructor. Students may consult the supplement that lists graduate courses, available in the department office.

Field Seminars

GOVT 601 Scope and Methods of Political Analysis
Fall. 4 credits.
W. Mebane.
This course introduces the major analytical approaches used in contemporary political science research. We touch on broad philosophical issues concerning the nature of theory and inference, the practices of cultural and historical interpretation, and the relevance of moral values and political commitments. Several kinds of research designs, including comparative case study and quasi-experimentation, are briefly examined. The basic analytical ideas involved in statistical methods such as sampling and regression analysis are introduced, as are the basic concepts of the theory of collective choice and the elementary methods of applied game theory.

GOVT 602 Field Seminar in Political Methodology
Spring. 4 credits.
W. Mebane.
This course introduces the quantitative methods most often used in contemporary political science research. We cover applied sampling and basic survey design, categorical data analysis, and basic regression analysis. The statistical methods are treated in conjunction with the problems of research design that most commonly arise in political science applications. Attention is given to the conventions accepted in political science for how a statistical analysis should be conducted and the results interpreted. A good basic course in probability and statistics is desirable, though not necessary, for preparation. Enrollment by interested undergraduates is encouraged.

GOVT 603 Field Seminar in American Politics
Fall. 4 credits.
E. Sanders.
The basic issues and institutions of American government and the various subfields of American politics are introduced. The focus is on substantive information and theoretical analysis and problems of teaching and research.

[GOVT 604 Field Seminar in Public Policy
4 credits. Not offered 1992–93.]

GOVT 605 Field Seminar in Comparative Politics
Spring. 4 credits.
R. Herring, J. Pontusson.
An introduction to selected theoretical problems in the study of comparative politics and to their application in empirical analysis. Basic problems are social class and politics, authority and legitimacy, participation and mobilization, economic development and democracy, authoritarian and totalitarian politics, corporatism and pluralism, and nation building and political integration.

GOVT 606 Field Seminar in International Relations
Spring. 4 credits.
S. Telhami, J. Goldgeier.
A general survey of the literature and propositions of the international relations field. Criteria are developed for judging theoretical propositions and are applied to the major findings. Participants will be expected to do extensive reading in the literature as well as research.

GOVT 607 Field Seminar in Political Theory
Fall. 4 credits.
S. Buck-Morss.
An introduction to political theory through a reading of selected classics in political thought from Plato to Marx.

American Government and Institutions

GOVT 610/410 Democratic Theory and Institutions
Fall. 4 credits.
A. Rutten.
For course description, see Government 410.

GOVT 613 Politics and Economics in Local Areas
Spring. 4 credits.
W. Mebane.
For course description, see Government 413.

[GOVT 614/414 The Administrative State
4 credits. Not offered 1992–93.]

GOVT 622 The Political Economy of American Development
Spring. 4 credits.
A. Rutten.
Over the past two centuries, the American economy has been radically transformed. Both politics and economics shaped that transformation. Politics determined the rules of the economic game; economics determined how people reacted to those rules, and which rules they wanted. In this course, we will consider the political causes and consequences of various features of the American transformation. These topics include the development and ratification of the constitution, westward expansion, the evolution of the common law, the politics and economics of slavery, the Civil War, the development of bureaucratic business and government, the regulatory state, the Great Depression, and the New Deal.

GOVT 624 Political Change in the United States
Spring. 4 credits.
M. Shefter.
This seminar analyzes the sources and consequences of major realignments in American politics.

[GOVT 625 Models for Research on Politics
4 credits. Not offered 1992–93.]

Public Policy

GOVT 626 Workshop on Law, Science and Technology
Spring. 4 credits.
S. Jasanoff.
Legal proceedings provide a powerful mechanism for deconstructing, and to some extent reconstructing, a society's understandings about the nature and social role of expertise, the boundaries of science and technology, and the meaning or validity of scientific "facts." Using a combination of primary legal materials and theoretical studies in science and technology, this course will explore how varying scientific realities are constructed in legal forums and what impact these constructions have on the social relations of science and technology. The course will also consider the policy implications of conflicting legal and scientific approaches to the discovery and verification of scientific facts.

GOVT 628 Politics of Technical Decisions I (also City and Regional Planning 541, Science and Technology Studies 415)
Fall. 4 credits.
M. Dennis.
For course description, see S&TS 415.

Comparative Government

[GOVT 632 Politics and Society in France, Italy, and Britain
4 credits. Not offered 1992–93.]

[GOVT 636 Political Development of the European Welfare State
4 credits. Not offered 1992–93.]

[GOVT 637 Peasantry, State, and Revolutionary Socialism
4 credits. Not offered 1992–93.]

[GOVT 642 The Future of European Security
4 credits. Not offered 1992–93.]

GOVT 643/443 Socialism and the Market in China
Spring. 4 credits.
V. Shue.
For course description, see Government 443.

[GOVT 644 Sociotechnical Aspects of Irrigation (also Agricultural Economics 754, Agricultural Engineering 754, and Rural Sociology 754)
4 credits. Not offered 1992–93.]

[GOVT 645 Chinese Politics
4 credits. Not offered 1992–93.]

GOVT 647 Political Anthropology: Southeast Asia
Fall. 4 credits.
B. Anderson.
The topic for this research seminar will be Nation/Sexuality/State. Discussion will focus on comparative historical analysis of the ways in which nationalisms and sexualities reinforce and conflict with each other, and the roles played by the state in defining and exploiting their relationships.

GOVT 648 Political Economy of Change: Rural Development in the Third World
Fall. 4 credits.
R. Herring.
The seminar analyzes strategies for economic, social, and political change using an approach that integrates economic, social, and political factors into a common framework dealing with policy choices and political action. Attention focuses particularly on developing local capacities for initiative and implementation with broader participation from rural communities.

[GOVT 649 State Institutions and Social Coalitions
4 credits. Not offered 1992–93.]

[GOVT 651 Agrarian Change in South Asia: Politics, Society, and Culture
4 credits. Not offered 1992–93.]

[GOVT 652 Southeast Asia Seminar: Philippines (also Asian Studies 601)
4 credits. Not offered 1992–93.]

GOVT 653 The Plural Society Revisited (also Asian Studies 607)
Spring. 4 credits.
B. Anderson.
John Furnivall's concept, invented 40 years ago, posited colonial society as one in which race (and ethnicity), class, occupation, and residence were distributed more or less isomorphically. The seminar will review the utility of the concept in the light of subsequent research on colonial Southeast Asia and its applicability to developments since the achieving of independence. It will also consider the relevance of the concept to (uncolonized) modern Thailand. The core problematic will be the relationship between classification (naming) and power.

[GOVT 655 Latin American Politics
4 credits. Not offered 1992–93.]

GOVT 656 Comparative Political Economy
Spring. 4 credits.
J. Pontusson.
This seminar seeks to specify the issues and analytical premises of comparative political economy as a subfield of political sciences. It explores the theoretical debates among political scientists doing political economy as well as the relationship of this literature to institutional economics and Marxist political economy. The readings deal primarily with advanced capitalist countries, and special emphasis is placed on Western Europe.

GOVT 657 Comparative Democratization
Fall. 4 credits.
S. Tarrow, V. Bunce.
This course aims at an introduction to the theoretical and methodological problems of studying democratization in a comparative framework and at developing diachronic studies of the democratization process. The major emphases will be the historical and recent origins of democratization; the preconditions of democracy and democratization; the preconditions of democracy and democratization processes; the problems of transitions to democracy from various other types of political system; the problem of democratic breakdown; and elites and mass publics in the process of democratization. Some attention will also be given to democratic consolidation and to the relationship between market development and political liberalization in the recent transitions in East-Central Europe.

[GOVT 658 Indonesia
4 credits. Not offered 1992–93.]

[GOVT 659 Politics in Western Europe: Transitions to Democracy
4 credits. Not offered 1992–93.]

GOVT 660 Social Movements, Collective Action, and Reform
Spring. 4 credits.
S. Tarrow.
This is a research seminar on the relationships among politics, organized social movements, and periods of mass mobilization like those that swept through Western Europe and the U.S. in the 1960s and in Eastern and Central Europe today. The course begins with a theoretical introduction to major approaches to social movements and collective action, concentrating on the factors that induce masses of people to adopt disruptive forms of collective action. It moves from there to a historical section focusing on cycles of protest in the recent and not-so-recent past. It continues with case materials that illustrate a series of theoretical problems in the study of movements and collective action—particularly that of the relations between protest and reform. Students will write term papers on particular cycles of protest and reform.

GOVT 692 The Administration of Agricultural and Rural Development
Spring. 4 credits.
N. T. Uphoff.
The political, bureaucratic, economic. and technical environments of administration for agricultural and rural development; the various functions involved in administration (personnel management, planning, budgeting, economic analysis, information systems); several major tasks (research, extension services, and infrastructure development); and specific problems of integrating activities, interfacing with rural populations, and utilizing external assistance. Intended primarily for persons who expect to have

some future responsibilities in agricultural or rural development administration and Third World countries.

Political Theory

[GOVT 661 The Political Theory of the American Founding
4 credits. Not offered 1992–93.]

[GOVT 665 American Political Thought
4 credits. Not offered 1992–93.]

[GOVT 666 Modern Political Philosophy
4 credits. Not offered 1992–93.]

GOVT 667 Major Figures in Modern Political Theory I
Fall. 4 credits.
N. Hirschmann.
This seminar will focus on three figures in modern political theory who present contrasting yet curiously related visions of politics. Emphasis will be placed on analytical treatment of historical works, and the course will strive to integrate historical and analytical political philosophy through weekly student papers and presentations of primary and secondary sources. Newer critical methods, such as feminism and postmodernism, may be utilized to locate a critical reading of texts within contexts of cultural history.

GOVT 668 Major Figures in Modern Political Theory II
Spring. 4 credits.
N. Hirschmann.
A complementary course to Government 667, this graduate seminar will allow students to continue intensive study of major figures in modern political theory through particular temporal or thematic lenses. While the focus of the seminar will change from year to year, the seminar will either engage in intensive analysis of two or three political theorists, or else will focus of a specific theme—such as freedom, justice, obligation—as it is treated by significant modern theorists.

[GOVT 669/670 Modern Social Theory I & II
4 credits each semester. Not offered 1992–93.]

GOVT 673 Republicanism and Liberalism
Fall. 4 credits.
I. Kramnick.
This seminar will look at the intellectual roots of what is today, at least in Anglo-American political thought, a central debate between community-oriented visions of the ideal polity and individual-centered ideals. The seminar will read Aristotle, Cicero, Machiavelli, Hobbes, Locke, Mill, Rousseau, Paine, Smith, and the *Federalist Papers*.

[GOVT 675 Gramsci and Cultural Politics (also German Literature 685)
4 credits. Not offered 1992–93.]

[GOVT 678 Classics in Political Thought
4 credits. Not offered 1992–93.]

International Relations

GOVT 679/479 *Dependencia* and the State
Fall. 4 credits.
For course description, see Government 479.

[GOVT 680 International Cooperation
4 credits. Not offered 1992–93.]

GOVT 681/478 Accumulation on a World Scale
Spring. 4 credits.
S. Jackson.
For course description, see Government 478.

[GOVT 682 International Relations of the Middle East (also Near Eastern Studies 682)
4 credits. Not offered 1992–93.]

[GOVT 683 Nuclear Arms Control—Theory and Practice
4 credits. Not offered 1992–93.]

[GOVT 684 Politics of the Arms Race
4 credits. Not offered 1992–93.]

GOVT 685 International Political Economy
Fall. 4 credits.
P. Katzenstein, J. Kirshner.
An exploration into a range of contemporary theories and research topics in the field of international political economy. The seminar will cover different theoretical perspectives and a number of substantive problems.

[GOVT 686 International Strategy
4 credits. Not offered 1992–93.]

GOVT 687 International Environmental Policy
Spring. 4 credits.
S. Jasanoff.
This course examines the emergence of the environment as an important item on the political agendas of nations and the evolution of national and international policy responses to the environmental issues. Analytically, the course attempts to define the distinctive characteristics of environmental policy and politics in our time and to identify the factors that promote convergences and divergences among different national approaches to the same environmental problems. The international, embracing developing as well as industrialized countries. Particular attention is given to the role of legal institutions, processes, and instruments in the resolution of environmental controversies. Among the specific issues to be considered are chemical control, risk communication, export of hazards, stratospheric ozone depletion, and global climate change.

GOVT 689 International Security Politics
Fall. 4 credits.
J. Goldgeier.
Course will examine a variety of international relations theories in studying a broad range of security issues, including the causes of war, alliance formation, balance-of-power politics, security regimes, nuclear and conventional deterrence, and core-periphery relations.

[GOVT 690 Domestic Politics and International Relations
4 credits. Not offered 1992–93.]

Independent Study

This course is *NOT* open to undergraduates. Undergraduates wishing to conduct supervised study should register for Government 499.

GOVT 799 Independent Study
Fall or spring. 4 credits.
Staff.
Government 799 is a course of individualized readings and research for graduate students. Topics, readings, and writing requirements will be designed through consultation between the student and the instructor.

Graduate students in government who are looking to use this as an option to fulfill their course requirements should check with their chairs to be certain that the program of study is acceptable for this purpose. Applications must be completed and signed by the instructor and by the chairs of their special committees. They are available from, and must be returned to, the graduate secretary in 125 McGraw Hall.

GREEK

See Department of Classics.

HEBREW

See Department of Near Eastern Studies.

HINDI-URDU

See Modern Languages and Linguistics.

HISTORY

S. Cochran, chair, T. H. Holloway, graduate faculty representative; B. Strauss, director of undergraduate studies; G. C. Altschuler, D. A. Baugh, S. Blumin, T. Borstelmann, P. R. Dear, I. V. Hull, P. R. Hyams, J. J. John, M. Kammen, S. L. Kaplan, J. V. Koschmann, D. C. LaCapra, W. F. LaFeber, R. L. Moore, J. M. Najemy, M. B. Norton, G. Okihiro, C. A. Peterson, J. R. Piggott, W. M. Pintner, R. Polenberg, W. B. Provine, M. Roldán, D. Sabean, T. Shiraishi, J. H. Silbey, F. Somkin, M. Steinberg, D. Usner, M. Washington, R. Weil, J. H. Weiss, D. Wyatt

Emeritus: K. Biggerstaff, E. W. Fox, P. W. Gates, F. G. Marcham, B. Tierney, O. W. Wolters

The popularity of history among Cornell students is due to its usefulness as preparation for graduate, professional, or law school and for any career that requires critical thinking and good writing; the reputation of the faculty for scholarship, teaching, and advising; and most of all, the intrinsic interest of the discipline. A wide variety of introductory and advanced courses is offered. The department is particularly strong in ancient, medieval, and modern European history; in American, Latin American, Chinese, and Southeast Asian history; and in the history of science.

The Major

To complete the history major, a student must fulfill the requirements listed below:

1) Complete three semesters of the following courses: Introduction to Western Civilization (History 151, History 152), Europe since 1789 (History 242), Colonial Latin America (History 295), Latin America in the Modern Age (History 296), Introduction to Asian Civilization (History 190, History 191), Islamic History 600–1258 (History 254), Islamic History, 1258–1850 (History 248), Science in Western Civilization (History 281, History 282). Students must complete (or be taking) two of the required semester courses before being admitted to the

major. The combination of History 152 and History 242 may not be used to fulfill this requirement.

2) Take history department courses totaling 40 credits and complete all these courses with a grade of C or better.

3) Take a minimum of 16 credits outside of American history and 12 credits in history before 1800.

4) Take at least one 400-level seminar.

The history department offers an honors program for students who wish to do research on a topic and to write a thesis on it during their senior year. In addition to writing a thesis, honors students must sustain a 3.5 average in their history courses, take the Honors Proseminar (History 400) plus an additional 400-level seminar, preferably during their junior year, and complete 44 credit hours in history. If you think you are eligible for the program and are interested in finding out more about it, sometime early in your junior year read the detailed statement in the catalog and then speak to a faculty member or to the faculty adviser about the honors program.

Course Offerings

Comparative history

History of science

American history

Latin American history

African history

Asian history

Near Eastern history

Ancient European history

Medieval, Renaissance, and early modern European history

Modern European history

Honors and research courses

Course Numbering System

100–level courses are very general introductory courses (like 151–152, 190–191) and freshman writing seminars.

200–249–level courses are similar to freshman writing seminars, except that there is greater emphasis on subject matter and less on writing.

250–299–level courses have no prerequisites and admit freshmen. They cover a relatively broad geographical area, period of time, or subject.

300–399–level courses may have specified prerequisites or deal with more-specialized subjects than do those numbered 250–299. Admission of freshmen varies from course to course and is indicated in the course descriptions.

400–499 are upper level undergraduate courses.

600–699 and 700–799 are graduate level courses.

Comparative History

[HIST 274 Foodways: A Social History of Food and Eating #
4 credits. Next offered 1993–94.
S. L. Kaplan.
An interdisciplinary examination of the validity of the adage "man is what he eats." Among the topics: food and nutrition, food and social structure, the politics of food control, food and modernization, taste making, and food in religion and literature. Cases will be drawn widely across space and time, from Pharaoh's Egypt to the 1980s.]

HIST 360 Early Warfare, East and West #
Spring. 4 credits.
C. A. Peterson.
A study of the principal modes of warfare found both in the East and the West from ancient times up to the eighteenth century. Tactical evolution and the impact of innovations are stressed, but attention is also paid to the general social and cultural background and the role of nonmilitary factors.

HIST 370 Resistance and Adaptation: Native American Responses to the Conquest #
Fall. 4 credits.
M. Roldán and D. Usner.
A comparative examination of American Indian responses to European colonialism across the Western Hemisphere. Beneath the broad outline of conquest, Indian societies have experienced a wide range of encounters and exchanges with colonial societies. We will explore how pre-Columbian cultures, intertribal relations, population changes, and other factors shaped different Native American strategies of resistance and adaptation. Indian-colonial relationships will be examined closely in selected regions and periods. The long-term evolution of Indian people's ethnic identity and social status within North and South American nations will also be considered.

[HIST 380 Social History of Western Technology
4 credits. Next offered 1993–94.
For description see History of Science.]

[HIST 393 Images of Humanity in Medieval China (also Society for the Humanities 425) @ #
4 credits. Permission required. Next offered 1993–94.
J. R. McRae and C. A. Peterson.
Marcham Seminar. The middle period in China's history, essentially the T'ang and Sung dynasties, feature some of the highest achievements of Chinese civilization. These centuries (the seventh through the thirteenth) are distinguished by the exceptionally high levels of literature, art, religious and secular thought, and proto-scientific development, as well as by fundamental changes in state, society, and the economy. This seminar will explore the China of this age by examining the lives of several representative figures—a politician, a poet, a Buddhist monk, a Taoist priest, an emperor, an empress, a "detective" and others. The aim will be to reconstruct the inner and outer worlds of men and women perhaps not so far removed from ourselves in their basic motivations and daily concerns.]

[HIST 405 Population and History #
4 credits. Open to sophomores. Not offered 1992–93.
S. L. Kaplan.]

[HIST 407 Death in Past Time #
4 credits. Not offered 1992–93.
S. L. Kaplan.]

[HIST 409 Seminar on Work in Europe and America #
4 credits. Next offered 1993–94.
S. L. Kaplan.
A comparative study of the meaning of work in different societies from premodern times to the present. Emphasis on the "representations" of work of the actors themselves who worked, as well as of those who for various critical reasons did not work. The seminar will examine not only ideology but also the organization, practice, and physical place of work. It will explore theory as well as "cases," and draw on anthropological and sociological as well as historical materials.]

[HIST 413 The History and Economics of Whaling in North America (also Agricultural Economics 454 and Society for the Humanities 413) #
4 credits. Not offered 1992–93.
D. Usner, J. Conrad.]

HIST 432 The City in History #
Fall 4 credits. Prerequisite: permission of instructor.
S. Blumin.
Reading and discussion of significant interpretations of the rise, role, and character of cities in medieval and early modern Europe and in modern Europe and America. Further reading on a topic of student's choice.

[HIST 451 Lord and Peasant in Europe: A Seminar in Social History #
4 credits. Prerequisite: permission of instructor. Not offered 1992–93.
S. L. Kaplan.]

HIST 454 The Herodotean Moment: The Uses and Abuses of "Western Civilization" (also Government 454) #
Fall. 4 credits. Limited to 20 students. Prerequisite: permission of instructor.
M. Bernal, J. M. Najemy.
The basic premise of the seminar is that the concept of "Western civilization" is a problematic one in need of critical analysis. The course will examine the historical evolution of the concept as seen in selected moments of actual and perceptual encounter with other civilizations. It will also inquire into the political uses and abuses of the concept, as well as its discursive, psychological, and anthropological dimensions.

[HIST 471 Black Emancipation in Comparative Perspective (also Africana Studies 471; Society for the Humanities 426) #
4 credits. Prerequisite: one course in American, Afro-American, or African history. Next offered 1993–94.
M. Washington.
This course will explore the black emancipation experiences in comparative perspective. Primary emphasis will be on Africa and the United States; secondary focus will be the Caribbean and Latin America. The African component will investigate social consequences of emancipation, the transformations accompanying that process and the experiences of former slaves. Perspectives on the Americans will include the complexities of emancipation, its socio-economic results and the legacy of race relations.]

[HIST 708 Seminar on the History of Food
Not offered 1992–93.
S. L. Kaplan.]

History of Science

HIST 233 Agriculture, Science, and Society: From Squanto to Biotechnology (also Science and Technology Studies 233)
Fall. 4 credits.
M. Rossiter.
This course will survey the major themes in the development of agriculture and agribusiness in the United States in the nineteenth and twentieth centuries. These include particular individuals (such as Liberty Hyde Bailey, Luther Burbank, G. W. Carver, Henry A. Wallace, and Norman Borlaug), the rise of government support and institutions (including U.S.D.A. and Cornell), noteworthy events (the Dust Bowl, World War II, and the environmental movement), and the achievements of the recent Green and "Gene" Revolutions.

HIST 281 Science in Western Civilization (also Science and Technology Studies 281) #
Fall. 4 credits. History 281 is not a prerequisite to 282.
P. R. Dear.
This course aims to make comprehensible both to science majors and to students of the humanities the historical structure and development of modern science and to show science as a cultural phenomenon. Changing perceptions of nature and human knowledge from Greek Antiquity to the twentieth century form the framework for current Western views of the world, while the roots of the present-day dominance of "science" as a symbol of progress and modernity lie in an alliance between knowledge of nature and power over nature that took shape in the nineteenth century after a long period of emergence. 281 runs chronologically up to the death of Isaac Newton and focuses on the cultural traditions of Christian Europe and its selective appropriation of a Greek heritage.

[HIST 282 Science in Western Civilization (also Science and Technology Studies 282) #
4 credits. History 281 is not a prerequisite to 282. Not offered 1992–93.
P. R. Dear.]

HIST 287 Evolution (also Biological Sciences 207 and Science and Technology Studies 287)
Fall. 3 credits.
W. Provine.
Evolution is the most central concept in biology. This course examines evolution in historical and cultural context. Aims of the course include understanding of the major issues in the history and current status of evolutionary biology, and exploration of the implications of evolution for culture. Issues range from controversies over mechanisms of evolution in natural populations to the conflict between creationists and evolutionists.

HIST 288 History of Biology (also Biological Sciences 202 and Biology and Society 288 and Science and Technology Studies 288)
Spring. 3 credits. Prerequisite: one year of introductory biology.
W. Provine.
An examination of the history of biology, emphasizing the interaction of biology and culture. Original writings of biologists constitute the bulk of reading assignments. This course covers the period from Classical antiquity to the present, but primary emphasis is on twentieth-century biology.

[HIST 380 Social History of Western Technology #
4 credits. Next offered 1993–94.
J. H. Weiss.
Studies in the interaction between technological changes and social changes in Western Europe and America since the eighteenth century. Readings and lectures will deal both with instances of social transformation that accompanied technological changes and with the role of technology in social thought and cultural expression. Special attention to three periods: Britain during the Industrial Revolution, America in the nineteenth century, and America during the Vietnam War.]

HIST 433 Comparative History of Science (also Science and Technology Studies 433) #
Spring. 4 credits.
M. Rossiter.
A survey of the major scientific institutions in foreign nations, including developing countries. The course covers the period 1660 to the present and gives some attention to who in each country becomes a scientist, who rises to the top, and who emigrates. Weekly readings and a research paper.

HIST 444 Historical Issues of Gender and Science (also Women's Studies 444 and Science and Technology Studies 444)
Spring. 4 credits. Open to sophomores.
M. W. Rossiter
One-semester survey of women's role in science and engineering from antiquity to the 1980s with special emphasis on the United States in the twentieth century. Readings will include biographies and autobiographies of prominent women scientists, educational writings and other primary sources, and recent historical and sociological studies. By the end of the semester, we shall have attained a broad view of the problems that have faced women entering science and those that still remain.

[HIST 465 Scientific Rhetoric in Historical Perspective (also Society for the Humanities 425 and Communication 465 and Science and Technology Studies 465)
4 credits. No prerequisites. Not offered 1992–93.
P. Dear and B. Lewenstein.]

[HIST 482 The Origins of Modern Science 1500–1700 (also Science and Technology Studies 482) #
4 credits. Next offered 1993–94.
P. R. Dear.
A seminar focusing on the changes in the European conception of nature and of human knowledge that created modern science. A new way of perceiving the world, and a new ideology justifying its experimental manipulation, transformed the finite, earth-centered, organic universe of 1500 into the infinite, mechanical universe of Isaac Newton. The course traces these developments above all through the study of primary materials, using the writings of Copernicus, Galileo, Descartes, Newton, and other lesser-known figures to discover how technical and philosophical innovations emerged from the changing worldview of early modern Europe.]

[HIST 487 Science, Technology, and Strategy in the Post–Napoleonic World (also Science and Technology Studies 487)
4 credits. Not offered 1992–93.
L. P. Williams]

HIST 488 The Golden Age of French Sciences: 1789–1830 (also Science and Technology Studies 488) #
Spring. 4 credits.
L. P. Williams.
In 1789, Antoine Laurent Lavoisier published his great *Elementary Treatise on Chemistry*, which created modern chemistry. In 1827, Pierre Simon de Laplace died. In between, such great French scientists as Lamarck, Cuvier, Ampere, Poisson, Biot, Bichat, Cabanis, and Pinel did their most important work. This seminar will deal with their original texts.

HIST 680 Seminar in Historiographical Approaches to Science (also Science and Technology Studies 680)
Fall. 4 credits.
P. R. Dear.
Examines philosophical, sociological, and methodological dimensions of recent historiography of science.

[HIST 681 Seminar in the History of Nineteenth-Century Physical Science (also Science and Technology Studies 681)
4 credits. Not offered 1992–93.
L. P. Williams.]

HIST 687 Seminar in the History of Agricultural Sciences (also Science and Technology Studies 687)
Fall. 4 credits. Permission of instructor required.
M. Rossiter.
Weekly readings and a research paper.

[HIST 781 Advanced Seminar in the History of Nineteenth-Century Physical Science (also Science and Technology Studies 781)
4 credits each term. Prerequisite: permission of instructor. Not offered 1992–93.
L. P. Williams.]

American History

HIST 101 Introduction to American History (also American Studies 101) #
Fall. 3 credits. 101 is not a prerequisite to 102.
G. C. Altschuler.
A survey of U. S. history designed to introduce students to major themes and interpretations. History 101 traces the origins and evolution of the nation through 1865. Topics include Puritanism, the American Revolution, the Constitution, Jacksonian democracy, and the Civil War.

HIST 102 Introduction to American History (also American Studies 102)
Spring. 3 credits. 101 is not a prerequisite to 102.
G. C. Altschuler.
A survey of U.S. history designed to introduce students to major themes and interpretations. Covers the period from the Civil War to the present. Topics include the Reconstruction, the Gilded Age, the world wars, the 1960s, Vietnam, and Watergate.

HIST 208 The Era of Franklin D. Roosevelt
Fall. 4 credits. Primarily for sophomores. Prerequisite: permission of instructor.
R. Polenberg.
The impact of the Great Depression and World War II on American politics, law, and culture.

HIST 209 Political History of Indians in the United States #
Spring. 4 credits. Primarily for sophomores. Prerequisite: permission of instructor.
D. H. Usner.
An investigation of political organization and change among Native American societies. Discussions and assignments examine forms of tribal government, diplomacy, and warfare, as well as political relations with European colonies and the United States. Specific topics include pan-Indian confederacies, Indian policy, struggles over sovereignty, and Indian strategies of autonomy and resistance.

[HIST 210 The Supreme Court and Civil Liberties
4 credits. Primarily for sophomores. Enrollment limited to 15 students. Prerequisite: permission of instructor. Not offered 1992–93.
R. Polenberg.]

HIST 213 Asian American History (also Asian American Studies 213)
Fall. 4 credits
G. Okihiro.
Comparative introductory history of Asian Indians, Chinese, Filipino, Japanese, and Koreans in the U.S. from about 1850 to World War II. Themes include U.S. expansionism in the Pacific, Asian migrant labor in Hawaii and the American West, the anti-Asian movement, and Asian resistance.

[HIST 214 Seminar on American Foreign Policy
4 credits. Open to freshmen and sophomores. Not offered 1992–93.
W. LaFeber.]

[HIST 227 Historical Perspectives on Modern American Sex Roles (also Women's Studies 227)
4 credits. Limited to 20 students. Intended primarily for sophomores. Not offered 1992–93.
M. B. Norton.]

HIST 238 The Historical Development of Women as Professionals, 1800 to the Present (also Women's Studies 238 and Human Development and Family Studies 258)
Fall. 3 credits.
J. Brumberg.
The historical evolution of the female professions in America (midwifery, nursing, teaching, librarianship, home economics, and social work) as well as women's struggles to gain access to medicine, law, the clergy, and the academy. Lectures, reading, film, and discussion are geared to identifying the cultural patterns that fostered the conception of gender-specific work and the particular historical circumstances that created these different work opportunities. The evolution of professionalism and the consequences of professionalism for women, family structure, and American society are also discussed.

[HIST 256 African-American History, 1945–85
4 credits. Open to freshmen with permission. Next offered 1993–94.
M. Washington.
This course focuses on the history, culture, and literature of African-American people during the post–World War II, civil rights, and revolutionary nationalist periods. This introductory course examines key issues, themes, and events in a context of contemporary relevance. Emphasis will be on the historical evolution of the modern Black community, Black-white race relations, and the impact of modern economic and political institutions on Black life and thought.]

[HIST 273 Women in American Society, Past and Present (also Women's Studies 273) #
4 credits. Next offered 1994–95.
M. B. Norton.
A survey of women's experiences in America from the seventeenth century to the present. Among the topics to be discussed are women's familial roles, the changing nature of household work, the women's rights movement, employment of women outside the home, racial and ethnic differences in women's experiences, and contemporary feminism.]

[HIST 275 Crime and Punishment: From the Puritans to Mickey Spillane
4 credits. Not offered 1992–93.
F. Somkin.]

HIST 276 American Indian History, 1500–1850 #
Spring. 4 credits.
D. H. Usner.
A survey of North American Indian history from the sixteenth century to the mid-nineteenth century. Relations between Indian nations and with European colonies will be explored. Different cultural groups and cross-cultural encounters will be compared, with emphasis on resistance and adaptation to European colonialism. The formative years of U.S. Indian policy and the experiences of Indian people through the removal era will receive close attention.

[HIST 277 American Indian History since 1850
4 credits. Next offered spring 1994.
D. H. Usner.
A historical study of American Indians in the United States and Canada from the mid-nineteenth century to the present. The active and complex role played by Indian people in their responses to government policies and to socioeconomic changes will be emphasized. Challenges faced and initiatives taken by Indians will be traced from the early reservation years to the current era of self-determination. Cultural change and continuity within Indian communities will be closely examined.]

HIST 279 Seminar on the Cold War
Fall. 4 credits.
T. Borstelmann.
This course will introduce freshmen and sophomores to the major issues and problems of the early Cold War period in American history: the 1940s and 1950s. It will devote equal time to domestic and foreign policy concerns, with particular attention paid to the links between them. Major topics include anti-communism, the origins of American-Soviet tensions, race relations, the Korean War, McCarthyism, American affluence, gender relations, and the cultural impact of nuclear weapons.

HIST 303 African-American Women in Slavery and Freedom (also Women's Studies 307)
Spring. 4 credits. Not open to freshmen.
M. Washington.
Historical exploration of African-American women from a sociopolitical perspective. Topics include women in africa, slavery and freedom, sexuality, labor, the family, feminism, and racism.

HIST 304 American Culture in Historical Perspective, 1880–1980
Spring. 4 credits.
M. Kammen.
An introduction to American Studies and the development of American culture. Emphasis upon relationships between mass culture, popular culture, and high culture; and on the question of American exceptionalism (distinctiveness). Special attention also to the situation of subcultures, to the changing role of the media, ethnicity (pluralism), and the popular arts.

[HIST 307 The Jewish Immigrant Experience
4 credits. Enrollment limited. Prerequisite: permission of instructor. Not offered 1992–93.
F. Somkin.]

HIST 309 U.S. and the Third World
Fall. 4 credits.
T. Borstelmann.
This course examines the development of American relations with Asia, Africa, Latin America, and the Middle East, with particular emphasis on the post–World War II period. Connections between domestic factors in the United States (such as race relations) and American foreign policy will be emphasized.

[HIST 311 The Structure of American Political History #
4 credits. Not offered 1992–93.
J. H. Silbey.
Examines the course of American politics from 1787 to the Civil War, focusing on the nature of decision making, popular and legislative voting behavior, and the role of interest groups, political parties, and political elites in shaping our political history.]

HIST 312 The Structure of American Political History
Fall. 4 credits.
J. H. Silbey.
Examines the course of American politics from 1865 to the present.

HIST 313 U.S. Foreign Relations, 1750–1912 #
Fall. 4 credits. Open to freshmen with permission of instructor.
W. LaFeber.
Examines policy and policymakers from Benjamin Franklin to Woodrow Wilson. Emphasis is placed on domestic events that shaped foreign policy.

HIST 314 History of American Foreign Policy, 1912 to the Present
Spring. 4 credits. Open to freshmen with permission of instructor.
T. Borstelmann.
Students examine the emergence of the United States as a world power in the twentieth century. The course focuses on the domestic sources of foreign policy and the assumptions of the major policymakers (Wilson through Reagan). Important themes include the American response to a revolutionary world since 1912, the role of American

racial views in the making of foreign policy, and the increasingly dominant role of the president in the making of U. S. foreign policy.

[HIST 318 American Constitutional Development
4 credits. Next offered 1994–95.
M. B. Norton.
A study of the major themes of the constitutional history of the United States. Among the topics to be considered are the drafting of the Constitution, the Marshall and Taney courts, the constitutional crisis caused by slavery and emancipation, the rise of substantive due process, the expansion of civil rights and liberties for women and men in the twentieth century, and the contemporary court.]

[HIST 319 The Frontier in American Thought and Culture
4 credits. Next offered fall 1993.
D. H. Usner.
As a kind of place and a cluster of symbols, the West has deeply influenced ideology and intellectual life in the United States. Using fiction, art, popular culture, and social sciences as primary texts, this course examines how concepts about race and class, society and environment, national destiny and development were fused into various forms of a frontier mythology.]

HIST 321 Colonial North America to 1763 #
Fall. 4 credits.
M. B. Norton.
A survey of European settlement in North America and the Caribbean, emphasizing the interactions of Europeans, Indians, and Africans; economic development; gender relations; religious and political change; and the impact on the colonies of internal and external conflicts.

HIST 323 The American Dream #
Fall. 4 credits. Open to freshmen.
F. Somkin.
The culture of the United States is markedly different from that of the rest of the English-speaking world. What makes Americans distinct? Lacking from the beginning the blood-and-soil amalgam of other peoples, American has been primarily a set of promises: the American Dream. The emphasis of the course will be on the ironic contrast between this vision at its most grandiose and present American realities.

HIST 325 Age of the American Revolution, 1763–1815 #
Spring. 4 credits.
M. B. Norton.
An examination of the process by which the thirteen English colonies became an independent and united nation, with emphasis on political thought and practice, social and economic change, and cultural development. Attention will be paid to the impact of the American Revolution on women, Blacks, and Indians as well as on white males.

[HIST 326 The Nation of Trial
4 credits. Not offered 1992–93.
M. Washington.]

[HIST 327–328 American Frontier History #
4 credits each term. Not offered 1992–93.
D. H. Usner.]

[HIST 330 The United States in the Middle Period, 1815–1850 #
4 credits. Not offered 1992–93.
J. H. Silbey.]

[HIST 331 The American Civil War and Reconstruction #
4 credits. Not offered 1992–93.
J. H. Silbey.]

HIST 332 The Urbanization of American Society #
Fall. 4 credits. 332 is not prerequisite to 334.
S. Blumin.
America was born in the country and moved to the city. This course examines the transformation of America from a rural to an urban society and culture, from the first European settlements to the present. It is also a history of the city itself, as a human community, a crucible of cultural contact and change, and a focus of public policy. Period, 1600–1860.

HIST 334 The Urbanization of American Society
Spring. 4 credits. 332 is not prerequisite to 334.
S. Blumin.
America was born in the country and moved to the city. This course examines the transformation of America from a rural to an urban society and culture, from the first European settlements to the present. It is also a history of the city itself, as a human community, a crucible of cultural contact and change, and a focus of public policy. Period, 1860–present.

HIST 335 African-American History from Slavery to Freedom #
Fall. 4 credits. Not open to freshman.
M. Washington.
Introductory course on African-Americans from 1619 to 1865. Emphasis will be on life in bondage, the free black communities, and racism. Other topics include African cultural heritage, the slave trade, religion, the family, and the black freedom struggle.

[HIST 336 Capitalism and Society in the United States #
4 credits. Next offered 1993–94.
S. Blumin.
An examination of American society in the context of capitalist development, and of capitalism as a social phenomenon. The transformation of pre-industrial colonies into an industrializing nation; the development of social classes; the emerging ethos of free enterprise.]

[HIST 337 Capitalism and Society in the United States
4 credits. Next offered 1993–94.
S. Blumin.
An examination of American society in the context of capitalist development and of capitalism as a social phenomenon. The rise of corporate capitalism; class and "mass" in twentieth-century American society.]

[HIST 340 Recent American History, 1929 to 1960
4 credits. Prerequisite: Not open to freshmen. Next offered 1993–94.
R. Polenberg.
Topics include radicalism and reform in the New Deal; Franklin Roosevelt and World War II; the Holocaust and the atomic age; the Cold War and civil liberties; individualism and conformity in the 1950s.]

[HIST 341 Recent American History, 1960 to the Present
4 credits. Not open to freshmen. Next offered 1993–94.
R. Polenberg.
Topics include the Supreme Court and civil rights; Kennedy, Johnson, and social reform; the Vietnam War and Watergate; the Carter, Reagan, and Bush presidencies; and class, race, and ethnicity in modern America.]

[HIST 344 American Ideas from the Puritans to Darwin #
4 credits. Not offered 1992–93.
F. Somkin.]

[HIST 345 The Modernization of the American Mind
4 credits. Next offered 1993–94.
R. L. Moore.
American thought and culture from 1890 to the present. Emphasizes the intellectual impact of major political and economic events and the adaptation of social ideas and values to new conditions.]

[HIST 346 Religion and the Cultural Life of Nineteenth-Century Americans (also Religious Studies 346) #
4 credits. Next offered 1993–94.
R. L. Moore.
An examination of religion as a basic component of popular cultures. The emphasis is not on churches but on how religious attitudes reached beyond formal organizations to shape the ways in which various American ethnic and racial groups organized, understood, and enjoyed their lives.]

HIST 359 American Families in Historical Perspective (also HDFS 359 and Women's Studies 357)
Spring. 3 credits. Prerequisite: HDFS 150 or one 200-level social science or history course. S–U grades optional. Human ecology students must register for HDFS 359.
J. Brumberg.
This course provides an introduction to and overview of problems and issues in the historical literature on American families and the family life cycle. Reading and lectures demonstrate the pattern of American family experience in the past, focusing on class, ethnicity, sex, and region as important variables. Analysis of the private world of the family deals with changing cultural conceptions of sexuality, sex roles, generational relationships, stages of life, and life events. Students are required to do a major research paper on the history of their family, covering at least two generations, and demonstrating their ability to integrate life-course development theory, data drawn from the social sciences, and historical circumstances.

HIST 370 Resistance and Adaptation: Native American Responses to the Conquest #
Fall. 4 credits.
M. Roldán and D. Usner.
For description, see Comparative History.

[HIST 375 The African-American Workers, 1865–1910: The Rural and Urban Experience (also ILRCB 385) #
3 credits. Prerequisite: juniors and seniors, or permission of instructor. Next offered 1993–94.
N. Salvatore.
Examines the history of blacks in America from Emancipation through the experience of

the first generation born after slavery, with a focus on the work experience. Topics will include the restructuring of work during Reconstruction; the relationship between work and black organizational developments; between black and white workers; and the nature of work in the agricultural south and in cities throughout the nation.]

[HIST 376 The African-American Workers, 1910–the present: Race, Work, and the City (also Industrial and Labor Relations 386)
3 credits. Prerequisite: juniors and seniors, or permission of instructor. Next offered 1993–94.
N. Salvatore.
This course will examine the history of blacks in America from the start of the Great Migration through the 1970s, with a focus on the work experience. Topics will include the effect of relationship between black and white workers as influenced by depression and two world wars; and an examination of the effect of the Civil Rights movement on the economic circumstances of black workers.]

[HIST 411 Undergraduate Seminar in American Political History
4 credits. Prerequisite: permission of instructor. Not offered 1992–93.
J. H. Silbey.]

HIST 412 Undergraduate Seminar in Asian American History (also Asian American Studies 412)
Spring. 4 credits.
G. Okihiro.
A reading and research seminar that will cover various topics in Asian American history. The topic for spring semester 1993 will be the idea of the "yellow peril" in European and American thought.

HIST 414 Motivation of American Foreign Policy
Fall. 4 credits. Prerequisite: Permission of instructor.
W. LaFeber.

[HIST 415 The United States and Russia, 1780 to 1914 #
4 credits. Enrollment limited to 16 students. Primarily for juniors and seniors. Prerequisite: permission of instructor. Not offered 1992–93.
W. LaFeber.]

[HIST 416 Six Americans #
4 credits. Not offered 1992–93.
F. Somkin.]

[HIST 418 Undergraduate Seminar in the History of the American South
4 credits. Prerequisite: permission of instructor.
J. H. Silbey.]

HIST 419 Seminar in American Social History
Spring. 4 credits. Prerequisite: permission of instructor.
S. Blumin.
Topic for 1993: To be announced.

HIST 421 Communication, Competition, and Social Control in American Life
Spring. 4 credits. Prerequisite: permission of instructor.
M. Kammen.
The topics in this undergraduate seminar will include the media, film, advertising, tourism, sports, etiquette, organized crime, and social conflicts involving language.

HIST 426 Undergraduate Seminar in Early American History (also Women's Studies 426) #
Fall. 4 credits.
M. B. Norton.
Topic for 1992: Religion, Gender, and Politics in Seventeenth-Century Anglo-America. Readings will include works by Sir Robert Filmer, John Locke, and Cotton Mather and the record of the trial of Anne Hutchinson.

[HIST 428 Undergraduate Seminar in American Frontier History #
4 credits. Not offered 1992–93.
D. H. Usner.]

[HIST 429 Undergraduate Seminar in Indians of Eastern North America #
4 credits. Next offered spring 1994.
D. H. Usner.
A seminar examining the history of Native Americans in the eastern woodlands from colonial times to the present. The cultural and economic participation of Indians in the evolution of frontier societies will be examined. Major topics include fur-trade networks, political relations, removal, and the persistence of Indian communities in eastern states.]

HIST 430 Undergraduate Seminar in Law and Authority in American Life
Fall. 4 credits. Limited to 15 juniors or seniors (any field).
F. Somkin.
Ours is a highly legalistic society, probably having more laws, rulings, hearings, re-hearings, trials, re-trials, appeals, decisions, and lawyers than any civilization in history. At the same time we are accustomed to a level of social violence known elsewhere only in the most murderously lawless environments. Obviously, a suffocating legalism and lives that are nasty, brutish, and short may coexist in an atmosphere of self-congratulation about the blessings of liberty. This course examines the nature of our legal system and its characteristic style of reasoning, with their underlying assumptions, myths, and illusions.

HIST 432 The City in History #
Fall. 4 credits. Prerequisite: permission of instructor.
S. Blumin.
Reading and discussion of significant interpretations of the rise, role, and character of cities in medieval and early modern Europe, and in modern Europe and America. Further readings on a topic of student's choice.

[HIST 439 Undergraduate Seminar in Reconstruction and the New South #
4 credits. Prerequisite: senior standing (in history) or permission of instructor. Next offered 1993–94.
M. Washington.
This course focuses on the American South in the nineteenth century as it made the transition from Reconstruction to new forms of social organization and patterns of race relations. Reconstruction will be considered from a sociopolitical perspective, concentrating on the experiences of the freedpeople. The New South emphasis will include topics on labor relations, economic and political changes, new cultural alliances, the rise of agrarianism, and legalization of Jim Crow.]

HIST 440 Undergraduate Seminar in Recent American History (also Jewish Studies 450)
Fall. 4 credits. Prerequisite: permission of instructor.
R. Polenberg.
Topic: Benjamin N. Cardozo, and the American Judicial Tradition.

[HIST 442 Popular Culture in the United States #
4 credits. Prerequisite: one year of course work in American history. Not offered 1992–93.
R. L. Moore.]

[HIST 458 Female Adolescence in Historical Perspective (also Women's Studies 438 and Human Development and Family Studies 417) #
3 credits. Next offered 1993–94.
J. Brumberg.
The changing nature of female adolescence in the United States is explored using nineteenth-century primary sources available in the Department of Manuscripts and University Archives and Olin Library and Mann libraries. Multidisciplinary readings and discussions are designed to uncover the nature of women's childhood, patterns of authority within the family, cultural attitudes toward sexuality, female friendships, courtship patterns, and rites of passage into adulthood.]

HIST 484 Seminar in the History of American Labor: Race, Work, and the City (also ILR 304)
Fall. 4 credits. Open to juniors and seniors only with the permission of the instructor.
N. Salvatore.
The seminar will examine the interplay of race, ethnicity, and the urban industrial economy during this century. We will explore the urban African-American world, its changing composition, work experiences, and associational life and study the impact of such social and economic forces as world war, migration, and government policy on black urbanites. To enroll in the course, it is necessary to see Professor Salvatore during preregistration.

HIST 608 African-American Women
Spring. 4 credits. Prerequisite: permission of instructor.
M. Washington.
A reading and discussion topics seminar focusing on the experiences of African-American women in nineteenth-century America, including the Caribbean. Topics include women and labor, abolitionism, women's rights, sexuality and race relations, education and racial uplift, black women's literature, marriage and family.

HIST 610 Afro-American Historiography
Fall. 4 credits.
M. Washington.
Reading and discussion course focusing on the way historians write and interpret the Black experience in America. Students will be concerned with individual historians, various schools of thought, and historical approaches.

[HIST 613 Seminar on American Diplomatic History
4 credits. Not offered 1992–93.
W. LaFeber.]

[HIST 614 Seminar on American Diplomatic History
4 credits. Not offered 1992–93.
W. LaFeber.]

[HIST 615–616 Seminar in American Cultural and Intellectual History
4 credits. Not offered 1992–93.
F. Somkin.]

[HIST 617–618 Seminar in Recent American Cultural History
4 credits each term. Next offered 1993–94.
R. L. Moore.
A reading and research seminar concerned with popular culture in nineteenth-century America.]

HIST 620 Seminar in American History
Fall. 4 credits.
M. Kammen.
This is a reading colloquium designed to prepare graduate students for the A exam in U.S. history. It will cover topics ranging from the seventeenth to the twentieth century. Emphasis on cultural, social, and political history, however, especially from the early republic to the present.

[HIST 621 Seminar in Modern U.S. Cultural History
4 credits. Next offered 1994.
M. Kammen.
The history of cultural criticism in the U.S. during the 20th century. Emphasis on the problem of cultural stratification and on the shifts from genteel to popular to mass culture. A research paper will be required.]

[HIST 624 Graduate Seminar in American Indian History
4 credits. Not offered 1992–93.
D. H. Usner.]

[HIST 626 Graduate Seminar in the History of American Women (also Women's Studies 626)
4 credits. Not offered 1992–93.
M. B. Norton.]

[HIST 627 Graduate Seminar in Early American History
4 credits. Not offered 1992–93.
M. B. Norton.]

[HIST 633 Seminar in Nineteenth-Century American History
4 credits. Prerequisite: permission of instructor. Not offered 1992–93.
J. H. Silbey.]

[HIST 634 Seminar in Nineteenth-Century American History
4 credits. Not offered 1992–93.
J. Silbey.]

[HIST 640 Graduate Seminar in Recent American History
4 credits. Prerequisite: permission of instructor. Not offered 1992–93.
R. Polenberg.]

HIST 683 Seminar in American Labor History
Spring. 3 credits.
N. Salvatore.
A reading and research seminar intended primarily for graduate students. Emphasis on discussion and analysis of major works in the field, covering nineteenth- and twentieth-century America.

HIST 710 Colloquium in American History
Spring. 4 credits. Required of all first-year American history graduate students.
J. Silbey.
Examination of the major themes, epochs, and interpretations of American history.

Latin American History

HIST 295 Colonial Latin America @ #
Fall. 4 credits.
M. Roldán.
Survey of Latin America from the rise of pre-Columbian civilizations through the European conquest, the establishment of the Spanish and Portuguese colonial societies, imperial rivalries in the New World, the background of the independence movements, and the achievement of political independence.

HIST 296 Latin America in the Modern Age @
Spring. 4 credits.
T. Holloway.
Survey of the Latin American nations from independence to the present. Major themes include the persistence of neocolonial economic and social institutions, the development of nationalist and populist politics, revolutionary movements of the twentieth century, and United States–Latin American relations.

[HIST 347 Agrarian Societies in Latin American History @ #
4 credits. Next offered 1993–94.
T. H. Holloway.
The development of rural patterns of wealth, status, and power, focusing on the role of country people in the larger society. Topics include disruption of the conquest, evolution from encomienda to hacienda, rise of plantation agriculture and export enclaves, decline of Indian communities, peasant protest, and land reform and development programs of the recent past.]

HIST 348 Contemporary Brazil @
Spring. 4 credits.
T. H. Holloway.
With some historical background, the course focuses on the twentieth century. Topics include the export-led growth model, contradictions leading to military rule 1964–1985, transition to competitive politics, debt, ecology, regional and social disparities. Some comparisons are made to other Latin American countries.

HIST 370 Resistance and Adaptation: Native American Responses to the Conquest #
Fall. 4 credits.
M. Roldán and D. Usner.
For description, see Comparative History.

HIST 424 Art and Politics in Twentieth-Century Latin America @
Spring. 4 credits. Prerequisite: permission of the instructor. (History 296 suggested.)
M. Roldán.
This seminar will examine the intersection of art and politics in Latin America and the role of both in constructing culture, ideology, and national/personal identity from the period of the Mexican Revolution through the military dictatorships of the late twentieth century. Topics will include the Mexican muralists and the Revolution (but including Frida Kahlo); working class and immigrant culture in Argentina and the tango; samba as a vehicle for social and political protest in Brazil; the (re)construction of gender and political self in the writings of Latin American women in exile; and the inscription of violence on public spaces and private bodies through graffiti and torture in the late twentieth century.

[HIST 449 Undergraduate Seminar in Latin American History @
4 credits. Prerequisite: permission of instructor. Next offered 1993–94.
T. H. Holloway.
Topic: History of Central America.]

HIST 475 Bandits, Deviants, and Rebels in Latin America @
Spring. 4 credits. Prerequisite: permission of instructor.
M. Roldán.
A seminar examining social protest and nonconformity in Latin American history. Focus on how religion, gender, and ethnicity define and legitimize protest and how language, symbols, and identity evolve to create a "collective memory" of resistance. Materials include oral histories, letters, songs, poems, and visual art.

[HIST 649 Seminar in Latin American History
Next offered 1993–94.
T H. Holloway.]

African History

[HIST 390 Southern African History @ #
4 credits. Next offered 1993–94.
G. Okihiro.
Southern African history from foundations to union, or from the earliest human inhabitants to 1910. Major themes will include the peopling of southern Africa, interaction and change among the San, Khoikhoi, and Bantu-speaking peoples, the arrival and expansion of Europeans, African state systems, and the economic transformation of the 1870s and 80s leading to the South African war and union.]

Asian History

HIST 190 Introduction to Asian Civilizations @ #
Spring. 4 credits.
C. A. Peterson, D. K. Wyatt.
An introduction to the distinctive cultures of China, India, Japan, and Southeast Asia that features an intensive examination of selected topics and periods of particular significance in the history of each.

HIST 191 Introduction to Modern Asian History @
Fall. 4 credits.
R. Ahmed, S. Cochran, and T. Shiraishi.
The history of Asia in modern times, focusing on the nineteenth- and twentieth-century history of major Asian countries/regions—Indian subcontinent, Island Southeast Asia (especially Indonesia and the Philippines), China, and Japan—in a larger, world and regional, historical perspective. English translations of memoirs, novels, short stories, and other documents are used to assess Asian perspectives, priorities, and ideas.

HIST 240 Modern South Asia, 1858–1947: Social and Political Foundations @
Fall. 4 credits.
R. Ahmed.
A survey of the social and political history of South Asia in the nineteenth and twentieth centuries. The course will concentrate on the social and political foundations of the three major South Asian countries—India, Pakistan, and Bangladesh—during the colonial period with particular focus on the role of the masses in the anticolonial struggle. It will emphasize the nature of response and reaction to colonial rule by the different classes and communities in the subcontinent and will

explore how they interacted with each other and joined hands in the common struggle for freedom. It will conclude with some reflections on the recent social and political developments in the three countries.

[HIST 243 China and the West before Imperialism @ #
3 credits. Open to freshmen and sophomores. Prerequisite: permission of instructor. Limited to 15 students. Not offered 1992–93.
C. A. Peterson.]

HIST 293 History of China up to Modern Times @ #
Fall. 4 credits.
C. A. Peterson.
A survey of the principal developments in the history of China from the earliest times to the eighteenth century that also undertakes a topical introduction to Chinese culture and civilization, in part by the use of visual materials.

HIST 294 History of China in Modern Times @
Spring. 4 credits.
J. Cody.
A survey that concentrates on the rise of the last imperial dynasty in the seventeenth and eighteenth centuries, the upheavals resulting from domestic rebellions and foreign imperialism in the nineteenth century, and the twentieth-century efforts to achieve social mobilization and political unity.

HIST 297 Premodern Japan: Historical Perspectives @ #
Spring. 4 credits.
J. R. Piggott.
This course explores the premodern civilization of Japan from a variety of historical perspectives. A textbook, readings from primary sources and literature, several historical essays, and a catalog of art treasures will be assigned. Students gain familiarity with the high points of premodern Japanese history and consider a number of comparative questions about Japan's premodern evolution compared with that of other parts of the world. (Graduate students should enroll in History 497. They will attend the lectures of History 297 and participate in their own colloquium.)

HIST 298 State, Society, and Culture in Modern Japan @
Spring. 4 credits.
J. V. Koschmann.
A survey of Japan from the mid-eighteenth century to the present, with special attention to changing configurations of institutional structure, knowledge, action, and conceptions of history. Japanese works in translation will be read and discussed in addition to secondary sources.

[HIST 326 From Medieval to Early Modern in Japan
4 credits. Not offered 1992–93.
J. R. Piggott.]

HIST 360 Early Warfare, East and West #
Spring. 4 credits.
For description see Comparative History.

[HIST 393 Images of Humanity in Medieval China (also Society for the Humanities 425) @ #
4 credits. Permission required. Next offered 1993–94.
J. R. McRae and C. A. Peterson.
For description see Comparative History.]

HIST 395 Southeast Asia to the Eighteenth Century @ #
Fall. 4 credits.
D. K. Wyatt.
A survey of the earlier history of Southeast Asia, concentrating particularly on regional movements of economic, social, cultural, and political change and using, to the extent possible, readings in primary sources.

HIST 396 Southeast Asian History from the Eighteenth Century @
Spring. 4 credits.
T. Shiraishi.
A survey of the modern history of Southeast Asia with special attention to the formation of modern states (colonial as well as national), changing economic and social structure, and consciousness. Primary texts will be read in translation whenever feasible.

HIST 417 Islam in South Asia (also Near Eastern Studies 453 and Religious Studies 417) @ #
Fall. 4 credits.
R. Ahmed.
This course will examine the dominant features of South Asian Islam, including the nature of beliefs and practices, the rituals and institutions in their different local contexts. One of the major objects of this course is to demonstrate that Islam never functioned as a monolithic system in South Asia and developed its own traditions in different local contexts, which did not necessarily conform to the orthodox interpretations by the ulema. It will conclude with a consideration of the major Islamic movements in South Asian Islam in more recent times.

[HIST 420 The Tale of Genji in Historical Perspective: Japan in the Year 1000 @ #
4 credits. Next offered 1993–94.
J. R. Piggott.
The tale of Genji is a classic of premodern Japanese literature and is often cited as the earliest novel in world literary history. It was written by a female courtier, Murasaki Shikibu, around the year 1000 A.D. The *Tale* provides readers a broad view into Japan's courtly society at a time when many of the elements of Japan's classical tradition were in the making.]

HIST 423 Seminar in Premodern Japanese History: Rise of the Samurai—Warrior Government and Culture in Japan @ #
Spring. 4 credits.
J. R. Piggott.
The seminar traces warrior institutions and culture from the Heian period (794–1185) through the Tokugawa age (1600–1868). This millennium spans the classical, medieval, and early modern ages. Because warriors governed Japan during much of this time, the story of warrior development opens a broad window onto premodern society. Students will read a variety of original sources in translation as well as analytical essays. Preliminary consultation with the instructor is advised.

HIST 434 The Social and Religious Movements in Colonial India @
Spring. 4 credits.
R. Ahmed.
A study of the social and religious movements in colonial South Asia, which arose as a response and reaction to British Rule in the subcontinent. These movements were not confined to the elite or to any particular community, but touched almost every section of the Indian society. Although these movements were basically social and religious in character, in reality many of these had specific political objectives and influenced the nature and course of the anticolonial struggle. We will concentrate on specific movements and examine the social and economic background of their participants and their programs and strategies. We also explore how these movements created conditions for communal polarization by transforming the attitudes of the masses towards each other on a communal basis.

[HIST 460 Seminar in Islamic History: Muhammad and the Rise of Islam (also Near Eastern Studies 418 and Religious Studies 418) @ #
4 credits. Not offered 1992–93.
D. Powers.]

[HIST 466 *The Taiheiki*: A Japanese Epic as History and Literature (also Society for the Humanities 426) @ #
4 credits. Not offered 1992–93.
J. Piggott, K. Selden.]

HIST 479 South Asia since 1947 @
Spring. 4 credits.
R. Ahmed.
The British left India in 1947 but did not take with them the colonial structure built over two hundred years of their rule in the subcontinent. The indigenous elites, including leaders such as Gandhi, Nehru, and Jinnah, who took over reins of the new states, were themselves the products of the colonial system and did not envisage any basic change in the structure of the states even after independence. They also had to address themselves to the pressing social and economic problems faced by the new states and satisfy the rising expectations of the new elites and also of the people. How far did they succeed? Did their attempts make any major break with the past? We will concentrate on the social, economic, and political developments in the three major countries of South Asia—India, Pakistan, and Bangladesh—in the post-colonial period and will examine the nature of changes that have shaped the history of region since 1947.

[HIST 489 Undergraduate Seminar in Modern Japanese History @
4 credits. Prerequisites: History 297 (formerly 397) or 298 (formerly 398) or equivalent, and permission of instructor. Not offered 1992–93.
J. V. Koschmann.]

HIST 491 Modern Japanese Studies: The Formation of the Field in History and Literature (also Asian Studies 491)
Spring. 4 credits.
V. Koschmann and N. Sakai.
The course will provide both a historical introduction to and critical analysis of the constitution of modern Japan studies as a "field" of postwar academic inquiry. While reading texts particularly influential in the early and contemporary formation of the field, we will consider such questions as the domestic and international contexts in which Japanese studies has been institutionalized and maintained, and the relationship between "Japan" as object of area studies discourse and "Japan" as represented in American journalism, popular culture, and politics. Interdisciplinary and team-taught, the course will aim to introduce students to a range of methodologies and approaches developed in historical

and critical works, problematizing assumptions in each case. Possibilities for cross-disciplinary research (along lines recently undertaken in areas such as feminist criticism and cultural studies, for example), will also be explored.

HIST 492 Undergraduate Seminar in Medieval Chinese History @ #
Fall. 4 credits. Prerequisite: History 293 or permission of instructor.
C. A. Peterson.
Topic for fall 1992: the Individual and the State in Medieval China.

[HIST 493 Self and Society in Late Imperial and Twentieth-Century China @
4 credits. Prerequisite: History 191 or 394 or permission of instructor. Not offered 1992–93.
S. Cochran.]

[HIST 494 The Japanese in Asia @
4 credits. Next offered 1993–94.
J. V. Koschmann, T. Shiraishi.
Japanese perceptions of Asia and Japan's economic, cultural, and political relations with the countries of East and Southeast Asia since the nineteenth century.]

[HIST 495 Japanese Kingship in Comparative Perspective @ #
4 credits. Not offered 1992–93.
J. R. Piggott.]

HIST 497 Colloquium in Premodern Japanese History @ #
Spring. 4 credits.
J. R. Piggott.
This graduate course explores the premodern civilization of Japan from a variety of historical perspectives. Students will attend History 297 lectures and participate in a special weekly colloquium.

[HIST 499 Art and Society in Modern China @
4 credits. Not offered 1992–93.
S. Cochran, M. Young.]

[HIST 691 Chinese Historiography and Source Materials
4 credits. Prerequisite: permission of instructor.
C. A. Peterson.]

[HIST 693 Problems in Modern Chinese History
4 credits. Prerequisite: permission of instructor. Not offered 1992–93.
S. Cochran.]

HIST 694 Problems in Modern Chinese History
Fall. 4 credits. Prerequisite: permission of instructor.
S. Cochran.

HIST 695 Early Southeast Asia: Graduate Proseminar
Fall. 4 credits.
D. K. Wyatt.
Introduction to the history of Southeast Asia for graduate students. Students will be expected to attend the lectures and complete the readings for History 395, and they will meet separately as a group to further explore selected topics.

HIST 696 Modern Southeast Asia: Graduate Proseminar
Spring. 4 credits.
T. Shiraishi.
Introduction to the modern history of Southeast Asia for graduate students. Students will be expected to attend the lectures and complete the readings for History 396, and they will meet separately as a group to further explore selected topics.

[HIST 697 Seminar in Southeast Asian Paleography
4 credits. Not offered 1992–93.
D. K. Wyatt.]

HIST 791–792 Seminar in Medieval Chinese History
791, fall; 792, spring. 4 credits each term.
Prerequisite: permission of instructor.
C. A. Peterson.

[HIST 793–794 Seminar in Modern Chinese History
793, fall; 794, spring. 4 credits each term.
Prerequisite: permission of instructor. Not offered 1992–93.
S. Cochran.]

HIST 795 Seminar in Modern Southeast Asian History
Fall. 4 credits. Permission of the instructor.
T. Shiraishi.
The seminar examines post–World War II, post-independence Southeast Asian history (excluding Indochina) in a comparative and international relations perspective (i.e., Southeast Asia under U.S. and then U.S.–Japan hegemony).

HIST 796 Seminar in Southeast Asian History
Spring. 4 credits. Prerequisite: reading knowledge of relevant languages.
D. K. Wyatt.
Topic for 1993: Southeast Asia, 1960–1975.

[HIST 797 Seminar in Japanese Thought
4 credits. Prerequisite: reading knowedge of Japanese. Not offered 1992–93.
J. V. Koschmann.]

HIST 798 Seminar in Japanese Thought
Spring. 4 credits. Prerequisite: reading knowedge of Japanese.
J. V. Koschmann.

Near Eastern History

HIST 248 Islamic History: 1258–1850 (also NES 258 and Religious Studies 258) @#
Fall. 3 credits.
L. Pierce.
This course will survey the major developments in Islamic social, political, and cultural history form the Mongol conquest until modern times. We will examine the impact of nomadic invasions and steppe culture on sedentary society in the Middle East and the rise of the great states characteristic of the post-Mongol period. We will also analyze the categories that have traditionally been used to define social structure in Islamic society. Throughout we will be concerned with contacts with Europe and will examine the validity of the model of the "rise" of the West and the "decline" of the Islamic world. The course will conclude by looking at colonialism and the rise of nationalism as background to current issues in the Middle East.

[HIST 254 Islamic History: 600–1258 (also NES 257 and Religious Studies 257)
3 credits. Next offered fall 1993.
D. Powers.
A survey of Islamic History from the lifetime of the Prophet to the Mongol conquest of Baghdad. Topics to be covered will include the emergence of Islam as a major world religion; the impact of the Arab conquests on the Mediterranean world; political, military, and cultural contacts between the Islamic Near East and Western Europe.]

HIST 382 Readings in Modern Turkish Culture and Society (also NES 383)
Fall. 4 credits. Prerequisite: NES 217–218 or permission of instructor.
L. Peirce.
Using selected texts, we will examine some of the major issues in the culture and society of modern Turkey. Topics include the role of Islam, the effects of the rapid urbanization of recent decades, and gender relations.

[HIST 660 Seminar in Islamic History: Muhammad and the Rise of Islam (also Near Eastern Studies 618 and Religious Studies 618)
4 credits. Nott offered 1992–93.
D. Powers.]

Ancient European History

HIST 151 Introduction to Western Civilization (also Science and Technology Studies 151) #
Fall. 4 credits.
B. Strauss.
History 151 deals with the political, social, economic, cultural and intellectual development of Europe and the Ancient Near East from the dawn of civilization to the Reformation. Readings are selected from original sources (in translation) and accounts by modern historians.

HIST 265 Ancient Greece from Homer to Alexander the Great #
Spring. 4 credits. Open to freshmen.
B. Strauss.
A survey of Greece from the earliest times to the end of the Classical period in the late fourth century B.C. The course focuses on the Greek genius: its causes, its greatness, its defects, and its legacy. The Heroic Age, the city-state, ancient democracy, and the intellectual ferment of the Greek Enlightenment are the main topics of study. Readings in translation from Homer, Aristophanes, Sophocles, Herodotus, Thucydides, Plato, Aristotle, and from the evidence of ancient inscriptions, coins, art, and architecture.

[HIST 266 War and Peace in Greece and Rome (also Government 393) #
4 credits. Open to freshmen. Not offered 1992–93.
B. Strauss, R. N. Lebow.]

[HIST 268 A History of Rome from Republic to Holy City #
4 credits. Open to freshmen. Next offered spring 1994.
B. Strauss.
A survey of Rome from the founding of the Republic to the end of the Western Empire. The focus is on the Roman conquest of the Mediterranean world and on the cultural reconquest of Rome by the vanquished. Roman politics, peasant society, Imperialism, and propaganda are the main topics of the first half. The government of the Caesars, society during the Roman peace, and the fertile interaction of Romans, Jews, and Greeks that produced Christianity are the main topics of the second. Readings in translation include Cicero, Polybius, Livy, Tacitus, Plutarch, and Saint Augustine.]

[HIST 338 War and Democracy (also Asian Studies 338)
4 credits. Not offered 1992–93.
B. Strauss and D. McCann.]

[HIST 373 The Greek City from Alexander to Augustus #
4 credits. Not offered 1992–93.
B. Strauss.]

[HIST 452 The Tragedy of Classical Athens, 462–404 B.C. #
4 credits. Prerequisite: History 265 or permission of instructor. Next offered 1993–94.
B. Strauss.
The nature of Athenian democracy, society, and culture in the "golden age" of Athens. The course will examine the influence of Athenian political life on the great tragedians of the age and the influence of tragedy on the Athenians' conception of their character and history. Readings from Herodotus, Thucydides, Aeschylus, Sophocles, Euripides, Aristophanes, Plato, Aristotle, and Plutarch.]

HIST 453 Crisis of the Greek City-State, 415–336 B.C. #
Spring. 4 credits. Prerequisite: History 225 or permission of instructor.
B. Strauss.
The fortunes of the city-state and citizen in an age of uncertainty. The focus is on Athens with some attention paid to the wider Greek world. Topics include the nature of Athenian politics, Athenian society, cultural change, the war between the city-states, crisis as a historical concept, and anthropology and ancient Greece. Readings in translation include Thucydides, Sophocles, Euripides, Aristophanes, Plato, Aristotle, Demosthenes, and Xenophon.

[HIST 455 The Family and Politics in Ancient Greece and Rome #
4 credits. Prerequisite: History 265, 268, or 461 or permission of instructor. Not offered 1992–93.
B. Strauss.]

[HIST 461 The Greco-Roman World in Late Antiquity and Early Byzantine Times, A.D. 306–565 #
Not offered 1992–93.]

HIST 630 Topics in Ancient History
Fall. 4 credits.
B. Strauss.
Topic for 1992: inter-ethnic relations in the Hellenistic world (with special interests in the military and society).

Medieval, Renaissance, and Early Modern European History

HIST 152 Introduction to Western Civilization #
Spring. 4 credits.
For description see Modern European History.

HIST 222 Public Life and Literature in Tudor England #
Fall. 4 credits. Prerequisite: permission of instructor.
F. G. Marcham.
A study of the chief developments in the political, governmental, and religious life of England in the sixteenth century and weekly discussions of a selection of Tudor prose, poetry, and drama.

HIST 257 English History from Anglo-Saxon Times to 1485 #
Fall. 4 credits.
P. R. Hyams.
A survey of the government, social organization, and cultural and religious experience of the English people. Particular stress is laid on the unification of the realm, the emergence of state insitutions such as parliament, and changes in economic organization (manors, towns and commerce). The approach will be comparative within a context of contemporary European developments and will emphasize paper-writing skills.

HIST 259 The Crusades #
Spring. 4 credits.
P. R. Hyams.
This lecture course examines the Crusading Movement and the states it produced from the eleventh century to the fall of the mainland Kingdom of Jerusalem in 1292. Central themes include: the history of the Church and its contextual intellectual history, political narrative and military history, social and economic analysis of Europeans in Outremer (the Mid-East), and especially the conflict of cultures and religions (a preliminary invitation to examine medieval Islam) during a formative period in Western civilization.

HIST 263 The Earlier Middle Ages (also Religious Studies 263) #
Spring. 4 credits.
J. J. John.
A survey of Medieval civilization from ca. 300 to ca. 1100 dealing with religious, intellectual, political, and economic developments in Western Europe.

[HIST 264 The High Middle Ages #
4 credits. Not offered 1992–93.
P. R. Hyams.]

HIST 349 Tudor and Stuart England #
Spring. 4 credits. Enrollment limited to 30.
R. Weil.
The political, religious, social, and cultural history of England in the sixteenth and seventeenth centuries. Readings will be mostly primary sources.

HIST 350 The Italian Renaissance #
Fall. 4 credits.
J. M. Najemy.
An exploration of intellectual, cultural, religious, and political developments in Italy from the crisis of the communes in the time of Dante and Marsilius, through the several stages of Italian humanism from Petrarch to Alberti to Pico, down to the generation of Machiavelli and Castiglione. The course will seek to problematize the notion of a "Renaissance" in the period's ambivalent attitudes toward history, learning, culture, language, and the role of intellectuals in politics and society. Emphasis will be placed on the close reading of primary sources and on issues of interpretation.

[HIST 351 Machiavelli #
4 credits. Next offered spring 1994.
J. M. Najemy.
This course will present Machiavelli in a variety of historical and interpretive contexts. European and Italian politics in the early sixteenth century; the decline of the Florentine republic and the rise of the Medicean principate; Machiavelli's own career in government and his, and the republic's, crisis in 1512–13; the intellectual traditions of Renaissance humanism, political thought, and the revival of antiquity; vernacular literary currents and popular culture; and the remarkable generation of political figures, writers, and theorists with whom Machiavelli associated and corresponded. Emphasis will be placed on a close reading of the major works (include the letters, *The Prince,* the *Discourses, Mandragola,* and selections from *The Art of War* and the *Florentine Histories,* all in translation) and a critical examination, in the light of that reading, of some major modern interpretations of Machiavelli.]

[HIST 365 Medieval Culture, 400–1150 (also Religious Studies 365) #
4 credits. Prerequisite: History 263 or permission of instructor. Next offered 1993–94.
J. J. John.
Intellectual and cultural developments in the age of monasticism, from St. Augustine and St. Benedict to St. Anselm and St. Bernard of Clairvaux.]

HIST 366 Medieval Culture, 1100–1300 #
Spring. 4 credits. Prerequisite: History 264 or permission of instructor.
J. J. John.
The origin and development of the universities will be studied as background for a consideration of the scholastic mentality and its influence on the art, literature, philosophy, science, script, and theology of the period. Readings from Abelard, Hugh of St. Victor, Bonaventure, Thomas Aquinas, Dante, and others.

[HIST 368 Marriage and Sexuality in Medieval Europe #
4 credits. Not offered 1992–93.
P. R. Hyams.]

HIST 369 The History of Florence in the Time of the Republic, 1250–1530 #
Spring. 4 credits.
J. M. Najemy.
Florentine politics and society from the communal period through the age of Dante, the rise and decline of the guild republic, the age of civic humanism, and the rise of the Medici to the time of Machiavelli. Economic structures and social classes, corporate politics, family history, and political and historical ideas are considered in the context of the emergence and transformation of republican government.

[HIST 371 History of England under the Tudors and Stuarts #
4 credits. Not opened to freshmen except by permission of instructor. Not offered 1992–93.
A survey of the period of reformation and revolution in which many historians have discerned the emergence of modern society. The course takes account of the relations of England with other parts of the British Isles and Europe, but emphasizes the workings of the political system as well as the impact of religious conflict and ideological change.]

[HIST 374 War, Trade, and Empire, 1500–1815 #
4 credits. Not offered 1992–93.
D. A. Baugh.]

HIST 377 Gender in Early Modern Europe @ #
Fall. 4 credits. Enrollment limited to 30.
R. Weil.
An inquiry into how masculinity and femininity were defined in early modern Europe. Questions to be explored include; What purpose did gender distinctions serve in this particular society? To what extent were men and women able to shape and redefine the meaning of their gender? How was their

ability to do so affected by such events as the Reformation and the French Revolution? Readings include both primary and secondary sources.

[HIST 387 Social and Cultural History of Sixteenth-Century Europe #
4 credits. Next offered 1993–94.
D. Sabean.
This course examines social processes and perceptions of change during the Reformation era. Topics include social differentiation in the countryside, forms of aristocratic domination, court society, rural and urban attempts at resistance and rebellion, violence, the exercise of state power and its representation, religious and political ideology, popular culture, and the reform of manners.]

HIST 388 Social and Cultural History of Seventeenth-Century Europe #
Spring. 4 credits.
For description, see Modern European History.

[HIST 405 Population and History
Not offered 1992–93.]

[HIST 408 Feudalism and Chivalry: Secular Culture in Medieval France, 1000–1300 #
4 credits. No prerequisites; History 263 or 264 would help. Not offered 1992–93.
P. R. Hyams.]

[HIST 409 Seminar on Work in Europe and America
4 credits. Not offered 1992–93.
For description see Comparative History.]

HIST 436 Conflict Resolution in Medieval Europe #
Fall. 4 credits.
P. R. Hyams.
This will be a seminar designed primarily for history majors, though all are welcome. It concentrates on a time (late ninth to thirteenth centuries) when much of Europe lacked formal systems of justice, and so handled questions of social control quite largely by extra-legal means. This is in a sense political history upside-down, from the viewpoint of individuals rather than their rulers. We shall examine ways in which anthropology can assist: the readings will be partly anthropology, partly translated medieval account of actual conflicts, with samples of recent interpretation.

HIST 443 Gender and War in European History (also Womens Studies)
Fall. 4 credits.
R. Schulte.
This course is meant to study the relationship of men and women in war and its transformation through war by looking at the traditional motif of the returning warrior in a variety of narratives, both fictional and historical, ranging from the classical mythology to chronicles and literary sources of the Thirty Years' War and World War I, and to oral history reminiscences of World War II in Central Europe. In the overall context of gender studies, this motif has recently been analyzed from anthropological and sociological, as well as literary viewpoints, all of which can contribute to a complex interdisciplinary reading.

[HIST 451 Lord and Peasant in Europe: A Seminar in Social History #
Not offered 1992–93.]

[HIST 461 The Greco-Roman World in Late Antiquity and Early Byzantine Times, A.D. 306–565 #
4 credits. Prerequisite: History 263, 265, or 268 or permission of instructor. Not offered 1992–93.
B. Strauss.]

[HIST 463 Seminar on Europe during the Age of Absolutism #
4 credits. Permission of instructor required. Next offered 1993–94.
D. Sabean.
This seminar examines different topics on the social and cultural history of Europe during the sixteenth and seventeenth centuries. It will be concerned with issues of power and state practice, popular culture, religion, rituals of domination and resistance, and the ideology of statecraft. Readings will include primary and secondary text.]

[HIST 468 Undergraduate Seminar in Renaissance History #
4 credits. Not offered 1992–93.
J. M. Najemy.]

[HIST 469 Emergence of the English State, 1530–1730 #
4 credits. Not offered 1992–93.
D. Baugh.]

[HIST 473 History of Sexuality #
Not offered 1992–93.]

HIST 481 The English Revolution #
Spring. 4 credits.
R. Weil.
Between 1640 and 1660, England experienced two decades of civil war and revolution and embarked on a fascinating series of attempts to reorganize political and religious life. Women and the lower classes emerged as actors on the political stage, radical religious sects flourished, and the nature of authority was questioned in both the family and the state. This course will explore the political, cultural, religious and social dimensions of the English Revolution, using mostly primary sources.

HIST 653 Medieval England-Britain-Europe
Spring. 4 credits.
P. R. Hyams.
This graduate seminar will examine select topics in the history of England before 1500 in the context of the histories of Britain as a whole (meaning those of Ireland, Scotland and Wales as well as England) and Medieval Europe. The source texts the class will study will be chosen to raise a wide variety of scholarly problems, reflecting the current research interests of instructor and participants. They will certainly include works and records with and without obvious aesthetic interest.

HIST 663 Graduate Seminar in Renaissance History
Spring. 4 credits. Open to undergraduates with permission of instructor.
J. M. Najemy.
Topic for 1993: Leon Battista Alberti and the traditions of Renaissance political discourse.

[HIST 664–665 Seminar in Latin Paleography
664, fall; 665, spring. 4 credits each term. Next offered 1993–94.
J. J. John.]

[HIST 666 Seminar in Medieval History
4 credits.
J. J. John.]

HIST 670 Political Culture in Early Modern Europe @ #
Fall. 4 credits.
R. Weil.
In recent years, historians of early modern Europe have attempted to transform the writing of political history by integrating the insights of cultural, social, and women's history, as well as other disciplines. This course will examine their efforts.

Modern European History

HIST 152 Introduction to Western Civilization (1600 to the end of World War II) (also Science and Technology Studies 152)
Spring. 4 credits.
L. P. Williams.
History 152 is offered in two distinct sections: A small number of papers is required in which the student will enjoy the pleasure of putting historical data together into a satisfying interpretive whole. Readings include a number of novels that cast light upon various periods or events, as well as original documents and interpretations by professional historians. History 151 is not a prerequisite for History 152, although it is recommended.

HIST 218 The Russian Military Effort and Foreign Policy #
Fall. 3 credits.
W. M. Pintner.
An examination of the interrelation of the Imperial Russian military effort and Russian foreign policy. Examples will be taken from various periods ranging from the early Muscovite period to the First World War. Students will write 6 or 7 short papers, do extensive reading, and participate in class discussion.

HIST 226 Public Life and Literature in Twentieth-Century Great Britain
Spring. 4 credits. Prerequisite: permission of instructor.
F. G. Marcham.
A study of British political, social, and constitutional history is paralleled by the reading of plays. Both history and literature are considered. The development of parliamentary democracy in Great Britain, the consequences for her of the two world wars, the emergence of the welfare state, the application to the economy of nationalization, and Great Britain's withdrawal from imperialism are presented. Among the writers read and discussed are Shaw, Maugham, O'Casey, Sherriff, and Osborne.

HIST 229 A History of European Childhood #
Fall. 4 credits.
N. Karwan Cutting.
Surveys the history of childhood in Europe from the mid–seventeenth century to the present. Comparisons are made across Western, Eastern, and Mediterranean European Societies. The course delineates those cultural, demographic, religious, political, and economic factors that shaped childhood, both in periods of transition and in times of violent instability. Changing perceptions of childhood are treated in the context of, for example: religious conflict, urbanization, developments in science and technology, war, and occupation. (All readings are in English.)

[HIST 242 Europe since 1789 #
4 credits. Next offered fall 1993.
M. P. Steinberg.
An introduction to major themes, problems, and interpretations in European history from the French Revolution to the consolidation of the Common Market and the collapse of the Soviet Union in our own day. The organization will be chronological, but focus will be on the varying forms of political and industrial revolution, liberalism, conservatism, socialism, nationalism, imperialism, fascism, and world war and on the interactions of politics and culture. Readings will include primary materials in political and social theory as well as literature.]

HIST 252 Russian History to 1800 #
Fall. 4 credits.
W. M. Pintner.
The origin and development of the fundamental social, political, economic, and cultural institutions that have determined the nature of contemporary Russian society.

HIST 253 Russian History since 1800 #
Spring. 4 credits. First preference will be given to students who have taken History 252 if enrollment is limited.
W. M. Pintner.
Nineteenth- and twentieth-century Russia, with emphasis on the major social, political, and economic changes that have transformed Russia since the mid-nineteenth century.

[HIST 258 English History from the Revolution of 1688 to the Present #
4 credits. Not offered 1992–93.
D. A. Baugh.]

[HIST 283 Contemporary European Society and Culture (also Government 343; German Studies 283)
4 credits. Not offered 1992–93.
J. H. Weiss, J. Pontusson, G. Waite.]

HIST 290 The History of the Soviet Union
Spring. 4 credits.
D. Hoffman.
This course will provide a survey of Soviet history from the Revolution of 1917 to the fall of Khrushchev in 1964 and will conclude with a brief overview of the Brezhnev and Gorbachev eras. Topics to be covered include the Revolution and Civil War, the New Economic Policy, collectivization and industrialization in the 1930s, the Great Purges, the Second World War, the Cold War, de-Stalinization, and attempts to reform the Soviet system. While the emphasis of this course will be political events, also to be discussed are economic, social, and cultural aspects of Soviet history.

[HIST 353 Nineteenth-Century European Intellectual History #
4 credits. Not offered 1992–93.
D. LaCapra.]

HIST 354 Twentieth-Century European Intellectual History (also Comparative Literature 340)
Fall. 4 credits.
D. LaCapra.
This course examines significant currents in twentieth-century thought in France, Germany, and England. Topics include the varieties of existentialism, the development of the social sciences, psychoanalysis, the modern novel, structuralism, and poststructuralism. Readings include Weber, Freud, Heidegger, Sartre, Camus, Woolf, Foucault, and Derrida.

[HIST 355 The Old Regime: France in the Seventeenth and Eighteenth Centuries #
4 credits. Next offered 1993–94.
S. L. Kaplan.
A systematic examination of the social structure, economic life, political organization, and collective mentalities of a society that eclipsed all others in its time and then, brutally and irreversibly, began to age. France, in European perspective, from the wars of religion through the age of Voltaire.]

[HIST 356 The Era of the French Revolution and Napoleon #
4 credits. Next offered 1993–94.
S. L. Kaplan.
A study of the failure of the traditional system, its dismantling and replacement in France, and the international consequences. Focus will be on the meaning of the revolutionary experience, the tension between the desires to destroy and to create, and the implications of the Revolution for the modern world.]

[HIST 357 Survey of German History, 1648–1890 #
4 credits. Open to freshmen with permission of instructor. Not offered 1992–93.
I. V. Hull.]

[HIST 358 Survey of German History, 1890 to the Present
4 credits. Open to freshmen with permission of instructor. Next offered spring 1994.
I. V. Hull.
The "German problem" is examined. Major topics include tensions caused by rapid industrialization presided over by a preindustrial, political elite; origins of World War I; growth of anti-Semitism; social dislocations of World War I; failure of the socialist revolution of 1918–1919; unstable Weimar democracy and the rise of nazism; the Nazi state; World War II; and the two Germanies.]

HIST 362 European Cultural History, 1815–1870 #
Spring. 4 credits.
M. P. Steinberg.
An analysis of major problems and themes associated with the construction and interpretation of European modernity, from the Enlightenment and the French and industrial revolutions to the unification of Germany. The interplay between political change and cultural and intellectual life will be stressed, with emphasis on primary materials (discursive works as well as painting, music, opera, architecture, and cultural festivals and institutions.

[HIST 363 European Cultural History, 1870–1945
4 credits. Next offered spring 1994.
M. P. Steinberg.
Modernism, social criticism, and new forms of knowledge, cultural representation, and cultural identity. An interdisciplinary approach, as with History 362; with an emphasis on primary materials in theory and the creative arts.]

[HIST 379 War and Society: The Origins of the First World War, 1870–1919 #
4 credits. Open to freshmen with permission of instructor. Not offered 1992–93.
I. V. Hull, W. M. Pintner, D. Baugh.]

[HIST 380 Social History of Western Technology
4 credits. Not offered 1992–93.
For description see History of Science.]

[HIST 383 Europe, 1900–1945
4 credits. Next offered 1993–94.
J. H. Weiss.
An investigation of the major developments in European politics between 1900 and the end of the Second World War. Emphasis on the rise and fall of democratic political systems and their alternatives. Topics include the reorientation of liberalism and socialism, the transforming effects of war and depression, the dynamics and diplomacy of fascism, the European response to the economic and ideological influence of America and the Soviet Union, the changes in Eastern Europe during the interwar years, and the interaction between politics and social structure.]

[HIST 384 Europe, 1945–1968
4 credits. Next offered 1993–94.
J. H. Weiss.
A political and social history of Europe between the fall of fascism and the political crises of 1968. Emphasis on the comparative study of the elaboration of democratic institutions and ideologies. Topics include the origins and course of the Cold War in Western and Eastern Europe, Gaullism and Christian Democracy, the emergence of welfare states, liberal-democratic and Communist culture, the end of colonial empires in the West, opposition movements in Eastern Europe, and the general upheaval of 1968.]

[HIST 385 Europe in 20th Century: 1968–1990
4 credits. Next offered 1993–94.
J. Weiss.
The major political developments in Europe between the upheavals of 1968 and the collapse of Communist regimes. Topics will include the effects of economic turndown in 1973–1974; the response to terrorism; regionalist movements; new ethnic minorities and their opponents; Socialist governments in southern Europe; the arrival of democracy in Spain, Portugal, and Greece; new dynamics in the European Community; the rise of Thatcherism; the war scare of the 1980s; and the final phase of the Cold War.]

HIST 388 Social and Cultural History of Seventeenth-Century Europe #
Spring. 4 credits.
D. Sabean.
An examination of cultural formations in a period of social and political crisis. Topics include the ideology of the patriarchal household, church and state programs of discipline, the reconstruction of the aristocracy, court society, Baroque culture, local and social systems, peasant revolts, gender construction, and representations of the self.

[HIST 405 Population and History
4 credits. Not offered 1992–93.]

[HIST 406 The People in the French Revolution #
4 credits. Next offered 1993–94.
S. L. Kaplan.
The Revolution was nothing if not a mass event. Mass action played a critical part in shaping its course. The "re-invention" of France affected the population down to each village and demanded decisions from virtually every adult. This course will focus on the people as actors: their collective memory, their ideologies, their repertoire of intervention, the formation of a popular political culture. It will examine the encounters between the people (in their multiple incarnations) and the revolutionary elites who sought to articulate and appropriate the

Revolution. A major theme will be the tension between the ambitions to achieve liberty and equality.]

[HIST 409 Seminar on Work in Europe and America
4 credits. Next offered 1993–94.
For description see Comparative History.]

[HIST 435 Collective Action and Politics in Modern Europe (also Government 435)
4 credits. Not offered 1992–93.
S. L. Kaplan, S. Tarrow.]

[HIST 441 Seminar in the European Enlightenment #
4 credits. Prerequisite: permission of instructor. Not offered 1992–93.
I. V. Hull.]

[HIST 450 Seminar in European Imperialism #
4 credits. Open to upper-level undergraduates. Prerequisite: permission of instructor. Not offered 1992–93.
I. V. Hull.]

[HIST 451 Lord and Peasant in Europe: A Seminar in Social History #
4 credits. Not offered 1992–93.]

HIST 456 Seminar on Modernity and Modernism
Spring. 4 credits.
M. P. Steinberg.
An exploration of the definitions of "modernity" from the Enlightenment to the present and of the varied responses, political, cultural, and aesthetic, known as "modernism." Discussion as well of the questions of the end of modernity, of the post-modern, and their implications.

[HIST 457 Seminar in European Fascism
4 credits. Prerequisite: permission of instructor. Not offered 1992–93.
I. V. Hull.]

HIST 459 The Making of the English Ruling Class #
Fall. 4 credits.
D. A. Baugh.
Perspectives on the landed aristocracy's continuing domination of politics and society. Topics include politics and political culture, social philosophy, aristocratic mores, the condition of the poor, and the role of London. Readings are drawn from modern historians and from the period.

[HIST 464 Russian Social History #
4 credits. Prerequisite: one semester of Russian history or permission of instructor. Not offered 1992–93.
W. M. Pintner.]

[HIST 467 Seminar in Modern European Political History
4 credits. Next offered 1993–94.
J. H. Weiss.]

[HIST 470 Social and Cultural History of Contemporary Europe
4 credits. Prerequisite: one course on contemporary Europe or permission of instructor. Next offered 1993–94.
J. H. Weiss.
Topic: the "other Europe": language, culture, and nation among the minority peoples of Europe. A comparative investigation of the development of the cultural and historical identity of non-dominant European ethnic groups and their relation to the formation and policies of European national states: the Basques, the Welsh, the Catalans, the Bretons, the Occitans, the Gaelic Irish, the Faroese, the Gypsies, the Romansh, and others. The course will combine historical, literary, and sociolinguistic approaches.]

[HIST 473 History of Sexuality #
4 credits. Not offered 1992–93.
D. Sabean.]

HIST 474 Topics in Modern European Intellectual History
Spring. 4 credits. Prerequisite: permission of instructor.
D. LaCapra.

[HIST 476 Documenting the Depression: Film, Literature, and Memory
4 credits. Prerequisite: permission of instructor. Next offered 1993–94.
J. H. Weiss.
Social and intellectual history of Britain and America in the 1930s with special attention to modes of documentary expression and to subjects lending themselves to treatment by film or oral history: work, popular culture, changes in urban and rural communities, family life, and poverty. George, Churchill, and Bevin—and the major (Habermas).]

[HIST 477 Seminar on the Politics of the Enlightenment #
4 credits. Next offered 1993–94.
S. L. Kaplan.
An inquiry into the historical origins of European (especially French) political, social, and economic thought, beginning in the 1680s, at the zenith of Louis XIV's absolutism, and culminating in the French Revolution a century later. Emphasis is on the relation of criticism and theory to actual social, economic, religious, and political conditions. An effort is made to assess the impact of enlightened thought on the eighteenth-century world and to weigh its implications for modern political discourse. Readings in translation from such authors as Bayle, Montesquieu, Voltaire, Rousseau, Diderot, and others as well as from modern scholarly and polemical literature.]

[HIST 478 Seminar in Eighteenth-Century French Social History #
4 credits. Not offered 1992–93.
S. L. Kaplan.]

HIST 480 Twentieth-Century Britain
Fall. 4 credits. Open to sophomores, juniors, and seniors.
D. A. Baugh.
A seminar course, focusing on political and social history. The main emphasis is on the two world wars and their role in British economic and imperial decline. The course also looks at some great personages—Lloyd George, Churchill, and Bevin—and the major political and social transitions, taking departure from Edwardian era.

[HIST 483 Seminar in Modern European Social History
4 credits. Not offered 1992–93.
J. H. Weiss.]

HIST 485 The Historical Origin of the Post-Soviet Successor States
Spring. 4 credits.
W. M. Pintner.
The course will deal with the peoples of several of the many new states emerging from the former USSR, probably including the Ukrainians, one of the Baltic Peoples, The Muslim Turks of Central Asia, and either the Georgians or the Armenians. Special attention will be paid to how each group came to be part of the Russian empire, their relations with Russians in both the pre- and post- revolutionary periods, and the growth of national consciousness within each national group.

HIST 490 The Transformation of Soviet Society
Fall. 4 credits. Limited 20 students.
D. Hoffmann.
This seminar will examine the process by which the Soviet Union was transformed from a rural-agrarian society into an urban-industrial one, and will pay particular attention to the interaction between political and social forces. Focusing on the pivotal decade of the 1930s, it will assess the impact of collectivization, industrialization, and urbanization upon Soviet society. Other topics to be covered include the legacy of the Bolshevik Revolution, the industrialization debates of the 1920s, de-Stalinization during the Khrushchev era, and the importance of these developments to the Soviet system's collapse under Gorbachev.

[HIST 498 German Cultural and Social Theory, 1870–1945
4 credits. Prerequisite (for undergraduates): History 363 or instructor's permission. Next offered 1993–94.
M. P. Steinberg.
The production and the critique of cultural ideology in political and cultural contexts from Nietzsche and Wagner to the Austrian "fin-de siêcle" and the rise of German sociology and the new art history, to the attempt at integrated cultural criticism of the Frankfurt School.]

[HIST 605 Graduate Seminar in European Cultural and Intellectual History
4 credits. Not offered 1992–93.
M. P. Steinberg.]

HIST 635 The Gates to Modernity: From Karlsbad to the 1848 Revolution (also German Studies 635)
Spring. 4 credits. Anchor course.
P. U. Hohendahl.
The seminar will focus on Germany's entry into the modern age represented by authors such as Heine, Büchner, Feuerbach, and Marx. The course will deal with the cultural, political, and social consequences of the Enlightenment, among them the democratization of literature and culture, the politicization of philosophy, and the emancipation of underprivileged groups (women and working class). The readings will trace the formation of bourgeois culture and its contradictions as they are articulated by the writers of Young Germany, the Left Hegelians, and radical literati of the 1840s. In addition to the authors mentioned above, readings will be taken from the works of Bettina von Arnim, Börne, Grabbe, Hebbel, and Fanny Lewald.

[HIST 655 Seminar in Eighteenth-Century British History
4 credits. Not offered 1992–93.
D. A. Baugh.]

[HIST 656 Seminar in Nineteenth-Century British History
4 credits. Not offered 1992–93.
D. A. Baugh.]

[HIST 661 Graduate Seminar in Twentieth-Century German History
4 credits. Prerequisite: permission of instructor. Not offered 1992–93.
I.V. Hull.]

[HIST 671 Seminar in the French Revolution
Not offered 1992–93.
S. L. Kaplan.]

HIST 672 Seminar in European Intellectual History
Fall. 4 credits.
D. LaCapra.

HIST 673 Seminar in European Intellectual History
Spring. 4 credits.
D. LaCapra.

[HIST 674 Graduate Seminar in German History, 1770–1918
4 credits. Not offered 1992–93.
I. V. Hull.
This course explores selected topics in the political, social, and cultural history of Germany from 1770 to 1918. It is designed to introduce graduate students to the history and historiography of modern Germany and to allow those with sufficient preparation to pursue directed research during the semester.]

HIST 675 After the Divide: German Critical Theory of the Seventies and Eighties (also Comparative Literature 675 and German Studies 675)
Fall. 4 credits.
P. U. Hohendahl.
The death of Theodor W. Adorno in 1969 marked the end of classical Critical Theory. During the following decade his students and disciplines moved in different and conflicting directions. In this country only the project of Jurgen Habermas has received serious and consistent attention. However, the German configuration of the 1980s is considerably more complex. The seminar examines the writings of H. M. Enzensberger, Habermas, O. Negt, A. Kluge, P. Burger, A. Wellmer, and C. Dahlhaus. Their works range from the social and political theory to aesthetic theory, as well as literary and music criticism.

[HIST 677 Seminar in Russian History
4 credits. Not offered 1992–93.
W. M. Pintner.]

[HIST 678 Seminar in Modern European Social History
4 credits. Not offered 1992–93.
J. H. Weiss.]

[HIST 679 Seminar in European Social History
Not offered 1992–93.
S. L. Kaplan.]

[HIST 682 Seminar in European Social and Cultural History
4 credits. Not offered 1992–93.
D. Sabean.]

HIST 750 European History Colloquium
Fall and spring. 4 credits.
D. Sabean, M. Steinberg, D. Baugh.
A research colloquium designed for European history graduate students. The colloquium will offer a forum for students to present papers and to discuss the work of visiting scholars.

Honors and Research Courses

Note: History 301–302 are not regular courses for which students may sign up at will. They are personal arrangements between an instructor and a particular student. Students must first gain the consent of a particular instructor to work with them.

HIST 301 Supervised Reading
Fall or spring. 2 credits. Open only to upperclass students. Prerequisite: permission of instructor.

HIST 302 Supervised Research
Fall or spring. 3 or 4 credits. Open only to upperclass students.
Prerequisite: permission of instructor.

HIST 400 Honors Proseminar
Fall and spring. 4 credits. Limited to 15 students. For prospective honors candidates in history. Prerequisite: permission of a member of the Honors Committee is required to register.
Fall: M. Kammen; Spring: M. B. Norton.
An examination of major approaches to historical inquiry and analysis. Masterworks of historical writing (traditional as well as recent) will be discussed. There will be one short essay and a longer paper (a study of the work of one major historian). The readings will be drawn from all time periods and diverse cultures.

HIST 401 Honors Guidance
Fall or spring. 4 credits. Prerequisites: History 400 and permission of instructor.

HIST 402 Honors Research
Fall or spring. 4 credits. Prerequisites: History 400 and permission of instructor.

HIST 703–704 Supervised Reading
703, fall; 704, spring. 4 credits each term. Limited to graduate students. Prerequisite: permission of instructor.

HIST 709 Introduction to the Graduate Study of History
Fall. 4 credits. Required of all first-year graduate students.
M. Steinberg, D. Usner.
The course is designed to introduce entering graduate students to crucial issues and problems in historiography that cut across various areas of specialization.

HISTORY OF ART

R. G. Calkins, acting chair; L. L. Meixner, director of undergraduate studies; K. Barzman, J. E. Bernstock, H. Foster, P. I. Kuniholm, C. Lazzaro, S. J. O'Connor, A. Ramage, M. W. Young

The visual arts—painting, sculpture, and architecture—are a principal mode of human expression. Art historians investigate works of art to understand them in their artistic, historical, and cultural contexts. Courses offered by the department cover the mainstream of Western art (Classical, Medieval, Renaissance, Baroque, and nineteenth and twentieth century) and non-Western art, including that of East and Southeast Asia. Art history is an integral part of interdisciplinary programs such as the Archaeology Program, the East Asia Program, Medieval Studies, and the Southeast Asia Program.

Course offerings vary in scope from introductory courses designed to acquaint the student with the ways of seeing, discussing, and writing about works of art to advanced seminars that concentrate on more specialized topics. The resources of the Herbert F. Johnson Museum of Art frequently serve as the focus for discussion sections and research assignments.

The Major

Students who want to major in the history of art should complete two courses in the Department of History of Art by the end of their sophomore year. One of the two courses counted for entry to the major must deal with material that is predominantly before A.D. 1500 or in a non-western tradition. These courses are prerequisites for admission to the major but may not be counted toward fulfillment of the major requirements. Prospective majors should apply to the director of undergraduate studies and in their junior and senior years work closely with their advisers to determine a course of study that takes into account the richness and diversity of art history. The program should include at least 30 credits in history of art courses and a minimum of two additional courses in this department or in a related field (such as anthropology, literature, or history) approved by their adviser. Ordinarily the 30 credits in history of art will include the proseminar History of Art 400, that all majors are expected to take in their junior year and at least two additional seminars selected from courses at the 400 or 500 level. Majors are required to have at least one non-Western art course in their program. Majors are encouraged to take studio courses offered by the Department of Art, but these are considered to be electives and do not fulfill major requirements.

Honors

To become a candidate for the degree of Bachelor of Arts with honors in the history of art, a student must have a cumulative average of B+ for all courses taken in the department and a cumulative average of B in all arts and sciences courses. Admission to the program requires application to the director of undergraduate studies during the second term of the junior year. The application must include a summary of the proposed project, an endorsement by a faculty sponsor, and a copy of the student's transcript. In the senior year the honors candidate will include among the regular requirements History of Art 600 and 601, which entail the preparation of a senior thesis. This program may not be condensed into one semester.

Freshman Writing Seminars

For Freshman Writing Seminar offerings in the History of Art, see the John S. Knight Writing Program's special brochure. These courses may be used as freshman electives but not to satisfy the distribution requirement.

Courses

ART H 202 Survey of European Art: Renaissance to Modern #
Summer only. 3 credits.
Staff.
The major traditions and movements in western European art from the Renaissance to the Moderns period. Painting, sculpture, and architecture.

ART H 220 Introduction to Art History: The Art of the Classical World (also Classics 220) #
Spring. 3 credits.
J. Whitehead.
The archaeology of the ancient Greeks and Romans as seen from a critical perspective. Major developments in Classical archaeology will be traced from treasure hunting to modern scientific research. Examples illustrating various approaches will be chosen: the sculpture, vase painting, and architecture of the ancient Greeks from the Geometric period through the Hellenistic, and the art of the Romans from the early republic to the late empire.

ART H 221 Introduction to Art History: Minoan-Mycenaean Art and Archaeology (also Classics 221 and Archaeology 221) #
Fall. 3 credits. Note: Students may not obtain credit for both this course and Classics 319.
J. Coleman.
For description, see Classics 221.

[ART H 223 Etruscan Art and Archaeology (also Classics 250 and Archaeology 250) #
3 credits. Not offered 1992–93.]

[ART H 224 Archaeology in Action I (also Classics 232 and Archaeology 232) #
Fall. 3 credits. Prerequisite: permission of instructor. Not offered fall 1992–93.
P. I. Kuniholm.]

[ART H 225 Archaeology in Action II (also Classics 233 and Archaeology 233) #
Spring. 3 credits. Prerequisite: permission of instructor. Not offered 1992–93.
P. I. Kuniholm.]

ART H 230 Introduction to Art History: Monuments of Medieval Art #
Spring. 3 credits.
R. G. Calkins.
An introduction to the approaches to art history through a study of selected works of art from the Middle Ages: architecture, sculpture, painting, manuscript illumination, metalwork, and ivory.

ART H 245 Introduction to Art History: Renaissance and Baroque Art #
Fall. 3 credits.
K. Barzman.
A survey of selected works of European painting, sculpture, and architecture from 1400 to 1700. The artists considered include Botticelli, Michelangelo, Bernini, Rembrandt, and Velazquez. These and other major artists will be emphasized and examined in artistic contexts of the principal trends and ideas of the time. In addition to distinguishing artists' styles and concerns, the course will consider other cultural factors shaping the work of art, such as patronage, religion, politics, and economics. This course is committed to improving student writing as well as teaching how to look at works of art.

ART H 260 Introduction to Art History: The Modern Era
Fall. 3 credits. Not open to students who have taken History of Art 261.
J. E. Bernstock.
A discussion of the most important developments in European art from 1780 to 1940. The emphasis is on major movements and artists such as Romanticism (Delacroix), Realism (Courbet), Impressionism (Monet), Post-Impressionism (van Gogh, Cezanne), Cubism (Picasso), Fauvism (Matisse), and Surrealism (Miro).

ART H 261 Introduction to Art History: Modern Art
Summer only.
L. L. Meixner.
An introduction to the major artists and masterpieces of the nineteenth and twentieth centuries, presented through lecture, video, and class discussion. Central figures include the Impressionists and the Cubists. Students also work with images on view at the Herbert F. Johnson Museum of Art.

ART H 265 Art from 1940 to the Present
Spring. 3 credits.
J. E. Bernstock.
Major artists and movements in the United States since 1940, beginning with Jackson Pollock and Abstract Expressionism, and continuing through recent developments in art. Attention is devoted to the critical reception that artists have received and to the artists' statements themselves.

[ART H 270 Introduction to Art History: American Art to 1945
3 credits. Not offered 1992–93.]

[ART H 280 Introduction to Art History: Asian Traditions @#
3 credits. Not offered 1992–93.
S. J. O'Connor.]

ART H 309 Dendrochronology of the Aegean (also Classics 309 and Archaeology 308)
Fall and spring. 4 credits. Prerequisite: permission of instructor. Limited to 10 students.
P. I. Kuniholm.
Participation in a research project of dating modern and ancient tree-ring samples from the Aegean and Mediterranean. Supervised reading and laboratory work. A possibility exists for summer fieldwork in Greece or Turkey.

[ART H 320 The Archaeology of Classical Greece (also Classics 320) #
4 credits. Prerequisite: History of Art 220 or Classics 220 or permission of instructor. Not offered 1992–93.
A. Ramage.]

[ART H 322 Arts of the Roman Empire (also Classics 350) #
4 credits. Prerequisite: History of Art 220 or permission of instructor. Not offered 1992–93.]

[ART H 323 Painting in the Greek and Roman World (also Classics 323) #
4 credits. Not offered 1992–93.
A. Ramage.]

[ART H 325 Greek Vase Painting (also Classics 325) #
4 credits. Not offered 1992–93.
A. Ramage.]

[ART H 326 Greek Cities and Towns (also Classics 326) #
4 credits. Prerequisite: History of Art 220 or Classics 220. Not offered 1992–93.
J. Coleman.]

[ART H 327 Greek and Roman Coins (also Classics 327) #
4 credits. Not offered 1992–93.
A. Ramage.]

[ART H 328 Greeks and Their Neighbors (also Classics 322) #
4 credits. Not offered 1992–93.
J. Coleman.]

ART H 329 Greek Sculpture (also Classics 329) #
Spring. 4 credits.
J. Coleman.
For description, see Classics 329.

[ART H 332 Architecture in the Middle Ages (also Architecture 382) #
4 credits. Not offered 1992–93.
R. G. Calkins.]

[ART H 333 Early Medieval Art and Architecture #
4 credits. Not offered 1992–93.
R. G. Calkins.]

[ART H 334 Romanesque Art and Architecture #
4 credits. Not offered 1992–93.
R. G. Calkins.]

[ART H 335 Gothic Art #
4 credits. Not offered 1992–93.]

ART H 336 Prelude to the Italian Renaissance (also Religious Studies 336) #
Fall. 4 credits.
R. G. Calkins.
An examination of Italian art, beginning with twelfth-century Sicily, and with emphasis on thirteenth- and fourteenth-century sculpture, painting, and to a lesser extent, architecture, including the works of Duccio, Giotto, the Pisani, and Lorenzetti, as the prelude to the Italian Renaissance.

[ART H 337 The Medieval Illuminated Book #
4 credits. Not offered 1992–93.
R. G. Calkins.]

[ART H 341 Flemish Painting #
4 credits. Not offered 1992–93.]

[ART H 342 Medieval and German Renaissance Art #
4 credits. Not offered 1992–93.
R. G. Calkins.]

[ART H 343 Italian Renaissance of the Fifteenth Century #
4 credits. Not offered 1992–93.
C. Lazzaro.]

[ART H 344 Italian Renaissance of the Sixteenth Century: Leonardo, Michelangelo, and Raphael #
4 credits. Prerequisites: one or more of the following courses: History of Art 245, 343, 350, 351, or permission of the instructor. Not offered 1992–93.
C. Lazzaro.]

ART H 345 Rome, Florence, and Venice in the Sixteenth Century #
Spring. 4 credits.
C. Lazzaro.
This course will examine the art of the sixteenth century in Rome, Florence, and Venice primarily in its social context. The political aims of the popes, the Medici dynasty, and the oligarchic Venetian Republic were served through architecture and urban development, state portraits, funerary monuments, and painted decoration in the Vatican, the Palazzo Vecchio, and the Doge's Palace. One of the distinctive features of sixteenth-century painting and sculpture is the sensuality in both religious and secular art, which will be examined in the context of both

artistic theory and the social construction of female. Art for this aristocratic society included portraits, mythological subjects (which emphasized sexuality and violence), and allegories. Social hierarchies were expressed in palaces, villas, and gardens, and in their painted decoration and sculpted ornaments. The artists examined include Raphael, Michelangelo, Pontormo, Bronzino, Giambologna, Titian, Palladio, and Veronese.

[ART H 350 The Culture of the Early Renaissance (also Romance Studies 361 and Comparative Literature 361) #
4 credits. Not offered 1992–93.
C. Lazzaro.]

[ART H 354 European Painting of the Seventeenth Century #
4 credits. Not offered 1992–93.]

[ART H 355 Painting and Public Life in Seventeenth-Century Northern Europe #
4 credits. Not offered 1992–93.]

[ART H 357 European Art of the Eighteenth Century #
4 credits. Not offered 1992–93.]

ART H 360 Painting and Everyday Life in Nineteenth-Century America (also American Studies 336) #
Spring. 4 credits. Prerequisite: History of Art 245 or 361 or permission of instructor.
L. L. Meixner.
This course is a social history of American painting from the Colonial era through the Gilded Age. Emphasis is placed on portraiture, history painting, landscape, and genre painting. Major movements such as the Hudson River School and Luminism are discussed within larger political and cultural contexts including Manifest Destiny and Transcendentalism. Broad issues include the impact of the Civil War and the postwar labor movement on art, and the role of the arts in a democracy. Artists studied include John S. Copley, Thomas Cole, Martin J. Heade, Lilly Martin Spencer, George Caleb Bingham, Mary Cassatt, Winslow Homer, Thomas Eakins, and John Singer Sargent. Alongside art historical texts, the writings of Walt Whitman, Ralph Waldo Emerson, and Stephen Crane will form the basis for classroom discussions.

ART H 361 The Social History of Nineteenth-Century European Painting #
Fall. 4 credits. Prerequisite: One of the following: History of Art 230, 245, 354, 360 or permission of instructor.
L. L. Meixner.
A study of major figures and movements of the epoch as they relate to political thinking and literary texts. The French Revolution, Napoleonic Wars, 1848 Revolutions, and the Third Republic frame discussions of artists including David, Goya, Friedrich, The French Realists and Impressionists, and Van Gogh. Chief literary figures included are Diderot, Sand, Baudelaire, and Zola. Class discussion will focus on the modern scholarship of Albert Boime, T. J. Clark, Griselda Pollock, Linda Nochlin, and Fredric Jameson.

[ART H 362 European Art 1900–1940
4 credits. Prerequisite: One of the following: History of Art 230, 245, 354, 360 or permission of instructor. Not offered 1992–93.
L. L. Meixner.]

[ART H 364 American Art 1900–1940
4 credits. Not offered 1992–93.]

[ART H 366 Problems in Modernism: "Primitivism"
4 credits. Prerequisite: History of Art 260 or permission of instructor. Not offered 1992–93.
H. Foster.]

[ART H 367 Problems in Modernism: "High" and "Low" Culture
4 credits. Prerequisite: History of Art 260 or permission of instructor. Not offered 1992–93.
H. Foster.]

ART H 371 Architectural History of Washington, D.C.
Fall or spring. Variable credit. Only for students in the Cornell-in-Washington program. Only for non-architects.
P. Scott.
A historical and critical survey of the architecture of Washington. Attention will be given to the periods, styles, architects, and clients—public and private—of the notable buildings and to the urbanscape of the nation's capital. The vocabulary of architectural analysis and criticism will be taught. Field trips required.

[ART H 376 Painting and Sculpture in America: 1850–1950
4 credits. Not offered 1992–93.]

[ART H 380 Introduction to the Arts of China @#
4 credits. Not offered 1992–93.
M. W. Young.]

[ART H 381 Buddhist Art in Asia @#
4 credits. Not offered 1992–93.
S. J. O'Connor.]

ART H 383 The Arts of Early China @#
Spring. 4 credits.
M. W. Young.
An introduction to the arts of China. The course will begin with the late Neolithic pottery culture and then examine in detail the arts of the Bronze Age and the Buddhist period, ending with the beginning of painting in the ninth century. The collection of the Herbert F. Johnson Museum of Art will be used in conjunction with the discussion sections.

ART H 384 The Arts of Japan @#
Fall. 4 credits.
M. W. Young.
A general introduction to the arts of Japan, intended to summarize the cultural achievements of the Japanese in such areas as architecture, gardens, painting, and sculpture. Although the course will follow a general chronological pattern, the arts will be approached topically, with special concentration on developments in the later periods of Japanese history, with particular emphasis on the arts related to Zen Buddhism. The tea ceremony, ceramics, and the minor arts will receive special attention through study of the Herbert F. Johnson Museum collection. The course will begin with an examination of Japan's earliest pottery traditions and end with a consideration of the wood-block prints of the nineteenth century. The museum collection will be used for written assignments.

[ART H 385 Chinese Painting @#
4 credits. Prerequisite: History of Art 383. Not offered 1992–93.
M. W. Young.]

[ART H 386 Art of South Asia @#
4 credits. Not offered 1992–93.
S. J. O'Connor.]

[ART H 388 Architecture and Gardens of Japan @#
4 credits. Not offered 1992–93.]

[ART H 389 Japanese Painting @#
4 credits. Not offered 1992–93.]

ART H 396 The Arts of Southeast Asia @#
Spring. 4 credits.
S. J. O'Connor.
The arts of Southeast Asia will be studied in their social context since in traditional societies art plays a role in most of the salient occasions of life. Special emphasis will be devoted to developments in Cambodia, Thailand, and Bali. Among topics covered will be the shadow puppet theater of Java, ceramics, architecture, and sculpture.

Seminars

Courses at the 400 and 500 level are open to upperclass students, majors, and graduate students. All seminars involve the writing and presentation of research papers. Enrollment is limited to 15 students, and *permission of the instructor is required.* Students may repeat courses that cover a different topic each semester.

ART H 400 Proseminar for Art History Majors: The History and Practice of Art History
Spring. 4 credits. Prerequisite: History of Art majors only. Enrollment is limited.
L. L. Meixner.
This seminar, limited to majors in the department, will serve a dual purpose. It will provide intensive training in the skills of visual analysis, critical method, and writing. Five short papers will be assigned, each analyzing a different art form and type of art-historical problem, from connoisseurship and stylistic analysis to research in the social history of art. The course will also provide a basic introduction to the historiography of the field and major writers and modes of inquiry that have been adopted for the study of the visual arts and architecture.

ART H 401 Independent Study
Fall or spring. 2–4 credits. May be repeated for credit. Prerequisite: permission of a department faculty member.
Hours to be arranged. Staff.
Individual investigation and discussion of special topics not covered in the regular course offerings, by arrangement with a member of the department.

ART H 402 Independent Study
Fall or spring. 2–4 credits. May be repeated for credit. Prerequisite: permission of a department faculty member.
Hours to be arranged. Staff.
Individual investigation and discussion of special topics not covered in the regular course offerings, by arrangement with a member of the department.

[ART H 404 Women Artists (also Women's Studies 404)
4 credits. Prerequisite: permission of instructor. Not offered 1992–93.
J. E. Bernstock.]

[ART H 406 Introduction to Museums
2 credits. Not offered 1992–93.]

[ART H 407 Seminar on Museum Issues
4 credits. Class will meet in the Herbert F. Johnson Museum of Art. Prerequisite: permission of instructor. Not offered 1992–93.]

[ART H 421 History of Art Criticism
4 credits. Prerequisite: History of Art 260 or any 300-level course in modern art or literature, or permission of instructor. Not offered 1992–93.
H. Foster.]

[ART H 423 Ceramics (also Classics 423 and Archaeology 423)
4 credits. Not offered 1992–93.
A. Ramage.]

ART H 425 Seminar on the Bronze Age Architecture of Asia Minor
Spring. 4 credits. Prerequisite: permission of instructor.
P. I. Kuniholm.
The course will cover major architectural building programs from Neolithic Catal Huyuk, Beycesultan, to the final phases of Troy and Hittite Bogazkoy. The art and archaeology of these civilizations will be taken into account when relevant. Reading knowledge of German useful.

[ART H 427 Seminar on Roman Art and Archaeology (also Classics 435) #
4 credits. Prerequisite: permission of instructor. Not offered 1992–93.
A. Ramage.]

[ART H 432 Sardis and the Cities of Asia Minor (also Archaeology 432 and Classics 432) #
4 credits. Not offered 1992–93.
A. Ramage.]

[ART H 434 The Rise of Classical Greece (also Classics 434) #
4 credits. Prerequisite: Classics 220 or History of Art 220, Classics 221 or History of Art 221, or permission of instructor. Not offered 1992–93.
P. I. Kuniholm.]

[ART H 448 Studies in Sixteenth-Century European Art #
4 credits. Prerequisite: permission of instructor. Not offered 1992–93.
C. Lazzaro.]

ART H 449 Studies in Italian Renaissance Art #
Spring. 4 credits. Prerequisite: permission of instructor.
C. Lazzaro.
Topic for spring 1993: Problems in Interpretation. This course will examine assumptions about meaning and how meaning is produced in Renaissance art. Various interpretative strategies will be examined, among them iconographic, semiotic, feminist, and psychoanalytic, within a specifically Renaissance literary, intellectual, and social context. Emphasis is on particular artists and works of art which have been examined from different points of view and have raised questions about kinds and levels of meaning. These include Piero della Francesca, Donatello, Botticelli, Bellini, Bronzino, and Veronese.

[ART H 450 Women in Italian Renaissance Art #
4 credits. Prerequisite: permission of instructor. Not offered 1992–93.
C. Lazzaro.]

[ART H 451 Prints of the Fifteenth through the Seventeenth Century #
4 credits. Not offered 1992–93.
C. Lazzaro.]

[ART H 456 The Social History of Art: Images of Labor and Problems in the Tradition of European Genre Painting, ca. 1550–1880 #
4 credits. Not offered 1992–93.]

[ART H 459 Caravaggio and Caravaggism in Seventeenth-Century Painting #
4 credits. Not offered 1992–93.]

[ART H 461 Fin-de-siècle Cultures in Europe, England, and America #
4 credits. Prerequisite: permission of instructor. Auditing is not permitted. Not offered 1992–93.
L. L. Meixner.]

ART H 462 Topics in Early Modernism
Fall. 4 credits. Prerequisite: permission of instructor. Auditing is not permitted. Not open to freshmen or sophomores.
L. L. Meixner.
Topic for 1992: Realism in Europe and America. A seminar on various Realist movements in nineteenth-century Europe and America. Chief artists include the German Biedermeier School, Menzel, Leibl, Courbet, Millet, Bingham, and Homer. Focal issues concern the relation of Realist art to contemporaneous political contexts, the 1848 Revolutions, the American Civil War, the Third Republic. Discussions will also center on the relation of genre, allegory, and narrative to Realist art. Foremost writings discussed belong to Linda Nochlin, Griselda Pollock, T. J. Clark, Fredric Jameson, Walter Benn Michaels.

ART H 463 Studies in Modern Art
Fall. 4 credits. Prerequisite: permission of instructor. No auditing permitted.
J. E. Bernstock.
Topic for 1992: Modern Sculpture. Developments in modern sculpture will be explored from their beginnings in the late nineteenth century. A wide range of styles, media, and content will be studied. The focus will be on major sculptors, such as Auguste Rodin, Constantin Brancusi, Henry Moore, David Smith, Alberto Giacometti, Louise Nevelson, George Segal, Donald Judd, Robert Morris, Eva Hesse, Richard Serra, and others.

ART H 464 Studies in Modern Art
Spring. 4 credits. Prerequisite: permission of instructor. Auditing is not permitted.
J. E. Bernstock.
Topic: Classical Mythology and Twentieth-Century Art. Twentieth-century artists have frequently interpreted classical mythology in accordance with their own personal experiences and their responses to societal and political disorders. This seminar will examine selected treatments of ancient myths (e.g., Apollo, Dionysos, the Minotaur, Oedipus) and how they have been affected by various phenomena, such as nationalism, psychoanalytic theory, and modern literature. Among the artists to be discussed are Salvador Dali, Barbara Hepworth, Oskar Kokoschka, Pablo Picasso, and Mark Rothko.

[ART H 476 Seminar in American Art
4 credits. Not offered 1992–93.]

[ART H 477 Impressionism in America and France #
4 credits. Prerequisite: permission of instructor. Not offered 1992–93.
L. L. Meixner.]

[ART H 478 Post-Impressionism in France
4 credits. Not offered 1992–93.
L. L. Meixner.]

[ART H 481 The Arts in Modern China @
4 credits. Not offered 1992–93.
M. W. Young.]

ART H 482 Ceramic Art of China and Southeast Asia @#
Spring. 4 credits. Prerequisite: permission of instructor.
S. J. O'Connor.
Chinese ceramics were a staple of the traditional trade of Asia for one thousand years. High-fired ceramics were also produced in Thailand and Vietnam to supply the brisk demand in maritime Southeast Asia. The Johnson Museum collection will be studied within the context of trade patterns and trading sites in the South China Seas.

[ART H 483 Chinese Art of the T'ang Dynasty @#
4 credits. Not offered 1992–93.
M. W. Young.]

[ART H 484 Studies in Japanese Art and Architecture @#
4 credits. Not offered 1992–93.]

[ART H 485 The Ceramic Arts of Japan @#
4 credits. Not offered 1992–93.]

[ART H 486 Studies in Chinese Painting @#
4 credits. Not offered 1992–93.
M. W. Young.]

[ART H 488 Traditional Arts of Southeast Asia @#
4 credits. Not offered 1992–93.
S. J. O'Connor.]

[ART H 491 Japanese Prints @#
4 credits. Not offered 1992–93.]

ART H 531 Problems in Medieval Art and Architecture (also Religious Studies 531)
Fall. 4 credits. Prerequisite: permission of instructor.
R. G. Calkins.
Topic for fall 1992: The Late Flemish Book of Hours.

[ART H 540 Seminar in Renaissance Art
4 credits. Prerequisite: permission of instructor.
C. Lazzaro.]

ART H 550 Seminar in Baroque Art
Spring. 4 credits. Prerequisite: permission of instructor.
K. Barzman.
Topic: To be announced.

[ART H 564 Problems in Modern Art: Post-1940 American Art
4 credits. Not offered 1992–93.]

[ART H 580 Problems in Asian Art
4 credits. Prerequisite: permission of instructor. Not offered 1992–93.
S. J. O'Connor.]

ART H 591–592 Supervised Reading
591, fall; 592, spring. 4 credits. May be repeated for credit. Limited to graduate students.
Staff.

[ART H 595 Methodology Seminar
4 credits. Prerequisite: permission of instructor. Not offered 1992–93.
H. Foster.]

[ART H 596 Problems in Art Criticism
4 credits. Not offered 1992–93.
S. J. O'Connor.]

ART H 600 Honors Work
Fall or spring. 4 credits. Intended for senior art history majors who have been admitted to the honors program.
Hours to be arranged. Staff.
Basic methods of art historical research will be discussed and individual readings assigned, leading to the selection of an appropriate thesis topic.

ART H 601 Honors Work
Fall or spring. 4 credits. Prerequisite: History of Art 600.
Hours to be arranged. Staff.
The student under faculty direction will prepare a senior thesis.

INDONESIAN

See Department of Modern Languages and Linguistics.

FALCON Program
J. U. Wolff, 307 Morrill Hall, 255-0733.

ITALIAN LANGUAGE AND LINGUISTICS

See Department of Modern Languages and Linguistics.

ITALIAN LITERATURE

See Department of Romance Studies.

JAPANESE

See Departments of Asian Studies and Modern Languages and Linguistics.

JAVANESE

See Department of Modern Languages and Linguistics.

KHMER (CAMBODIAN)

See Department of Modern Languages and Linguistics.

KNIGHT, JOHN S., WRITING PROGRAM

See John S. Knight Writing Program, p. 304.

LATIN

See Department of Classics.

LINGUISTICS

C. Rosen, director of undergraduate studies (311 Morrill Hall, 255-0722). See Department of Modern Languages and Linguistics.

MATHEMATICS

R. K. Dennis, chair; D. Barbasch, L. Billera, J. Bramble, K. Brown, L. Brown, J. Cao, S. Chase, M. Cohen, R. Connelly, R. Durrett, E. Dynkin, C. Earle, R. Farrell, L. Gross, J. Guckenheimer, A. Hatcher, Z. He, D. Henderson, P. Holmes, J. Hubbard, J. Hwang, P. Kahn, H. Kesten, D. Kozen, R. C. Liu, G. Livesay, M. Morley, A. Nerode, L. Payne, R. Platek, T. Rishel, O. Rothaus, A. Schatz, S. Sen, R. Shore, J. Smillie, B. Speh, M. E. Stillman, R. Strichartz, B. Sturmfels, M. Sweedler, M. Terrell, K. Vogtmann, L. Wahlbin, X. Wang, B. H. West, J. West, A. C. Zitronenbaum. (Emeritus: W. Fuchs, A. Rosenberg)

Mathematics is the language of modern science; basic training in the discipline is essential for those who want to understand, as well as for those who want to take part in, the important scientific developments of our time. Acquaintance with mathematics is also extremely useful for students in the social sciences and valuable for anyone interested in the full range of human culture and the ways of knowing the universe in which we live.

The Department of Mathematics faculty has strong groups specializing in algebra, number theory, real and complex analysis, Lie groups, topology and geometry, logic, probability and statistics, mathematical physics, and applied mathematics. Related departments at Cornell have specialists in computer science, operations research, linear programming, and game theory, and courses in these topics can be integrated readily into the mathematics major.

The department offers a rich variety of undergraduate courses, and many of its beginning graduate courses are suitable for advanced undergraduates as well. Under some conditions, a student may carry out an independent reading and research project for college credit under the supervision of a faculty member.

Members of the department are available to discuss with students the appropriate course for their levels of ability and interest, and students are urged to avail themselves of this help.

Students who want to take any of the courses numbered 300 or above are invited to confer, before registering, with the instructor concerned. The level of a course is indicated by the first digit of the course number: roughly, 1, 2, indicate underclass courses; 3, 4, upperclass courses; 5, 6, graduate courses. The subject matter of courses is indicated by the second digit: 0, general; 1, 2, analysis; 3, 4, algebra; 5,6, topology and geometry; 7, probability and statistics; 8, logic; 9, other.

Midterm grades, when required, will be S or U only, except in special circumstances. In all 600-level courses, in all grades will be S-U only, with the exception of 690. In courses with numbers below 600, students will receive letter grades, with the exception of non-mathematics majors who have requested an S-U grade.

Advanced Placement

Secondary school students are strongly urged to take one of the two advanced placement examinations of the College Entrance Examination Board in their senior year. Freshmen who have had some calculus but who have not taken an advanced placement examination should take the placement examination in mathematics offered at Cornell just before the beginning of classes in the fall. It is most important that anyone with any knowledge of calculus carefully read "Advanced Placement of Freshmen," p. 5.

The Major

The mathematics major adapts to a number of purposes. It can emphasize the theoretical or the applied. It can be appropriate for professionals and nonprofessionals alike. It can be broad or narrow. Questions concerning the major should be brought to a departmental representative.

Prerequisites: The preferred prerequisites are Mathematics 221–222 or 293–294. A unit on infinite series is required. Such a unit is offered in Mathematics 112, 122, and 192. Normally students will be admitted to the major only when they have grades of B– or better in all sophomore-level mathematics courses they have taken. Alternative prerequisites are Mathematics 213, 231, normally with grades of B+ or better.

Requirements

There are five requirements for the major:

1) Computer Science 100. Students are urged to take this course before the end of the sophomore year.
2) Two courses in algebra. Eligible courses are Mathematics 431 or 433, 432 or 434 or 332, 336.
3) Two courses in analysis. Eligible courses are Mathematics 411 or 413, 412 or 414, 418, 421, 422, 423.
4) Further high-level mathematical courses. Any one of the following is sufficient:
   a) three mathematics courses numbered 371 or higher, other than those used to satisfy the previous two requirements. Computer Science 621 and/or 622 may also be used toward satisfying this requirement.
   b) four Computer Science courses numbered 310 or higher.
   c) four Operations Research and Industrial Engineering courses numbered 320 to 383 or 431 to 472, but not 350.
5) One course dealing with mathematical models. Any one of the following is sufficient:
   a) Physics 208, 213, or 217.
   b) Computer Science 211, provided no Computer Science course has been used toward satisfying the previous requirement.

c) One course other than Physics 112 or 207 from outside mathematics with serious mathematical content and dealing with scientific matters, provided the course has not been used toward satisfying the previous requirement.

A course may be counted toward the mathematics major only if a grade of C- or better is received for that course. (Effective starting with majors in the class of 1994.)

Major advisers can alter these requirements upon request of an advisee, provided the intent of the requirements is met.

Sample Major Programs

Below are some suggestions for what the schedule of a student with a mathematics major might look like. Many variations are possible.

For Graduate School in Mathematics

First two years: Mathematics 111–122–221–222, Computer Science 100, Physics 207–208.

Last two years: Mathematics 433–434, 413–414, 453–454; two of 418, 428, 471.

The sophomore courses Mathematics 221–222 are more suitable than 293–294 in this case. A student planning to enter graduate school may get by with 411–412 and 431–432 instead of the honors versions 413–414 and 433–434, but the honors versions are strongly recommended.

For Many Technical Careers

First two years: Mathematics 111–122–221–222 or 191–192–293–294, Computer Science 100–211, Physics 112–213 or 207–208.

Last two years: Mathematics 431–336, 421–422, 428, 471–472.

Two or more semesters of computer science are highly recommended.

For Emphasis on Computer Science

First two years: Mathematics 111–122–221–222, Computer Science 100–211.

Last two years: Mathematics 431–432, 421–422, Computer Science 314, 381, 410, 414, 421.

Requirement 5 is met by Computer Science 381 in this sample program. Students interested in computer science should give consideration to a double major in mathematics and computer science.

For Emphasis on Operations Research

First two years: Mathematics 111–122–221–222 or 191–192–293–294, Computer Science 100–211.

Last two years: Mathematics 431–432, 421–422, 471; Operations Research and Industrial Engineering 320, 321, 361, two of 431, 432, 435, and possibly 462 or 471.

For Prelaw or Premed (first example)

First two years: Mathematics 111–122–221–222, Computer Science 100, Physics 207–208.

Last two years: Mathematics 431–336, 411–421, 381, 471–472.

The sophomore courses Mathematics 221–222 are recommended rather than 293–294 in this sample because they provide better preparation for 411.

For Prelaw or Premed (second example) or Prebusiness

First two years: Mathematics 111–112–213–231, Computer Science 100–211

Last two years: Mathematics 332–336, two of 411–421–418, and also 481, 403, 451.

A course in statistics is also strongly recommended.

For Secondary School Teachers

First two years: Mathematics 111–122–221–222, Computer Science 100.

Last two years: Mathematics 431–336, 411–421, 451, 403, 471, 408.

Honors. Honors in mathematics will be awarded on the basis of a high level of performance in departmental courses. Further requirements, if any, will be announced during the year.

Teacher Education in Science and Mathematics (TESM)

Students at Cornell may pursue teaching credentials in biology, chemistry, earth science, general science, mathematics, and physics. TESM is a university program jointly conducted by the departments of education and mathematics. Although TESM offers options for undergraduate and graduate study, most students enroll in a five-year program, which combines an undergraduate major in mathematics or one of the sciences with a one-year Master of Arts in Teaching (MAT). Students from any college at Cornell are eligible to apply to the program as undergraduates. Students who complete their undergraduate studies and their student teaching are eligible for provisional teaching certification from the State Education Department, effective for five years. Students completing the graduate program can earn the master's degree required for permanent certification.

For more information, contact the TESM Student Support Specialist at 255-9255 or the program coordinator, D. Trumbull (Education) 255-3108 or, in Mathematics, A. Solomon 255-3894 or D. Henderson 255-3523.

Distribution Requirement

The distribution requirement is satisfied in mathematics by any 6 credits, not including more than one course from Mathematics 105 or 403. Computer Science 100 may be used for three of these credits. The mathematics distribution requirement is also satisfied by a score of 3 or higher on the CEEB calculus BC examination. Mathematics 109 or ALS 115 (College of Agriculture and Life Sciences) may not be used to satisfy the requirement.

Basic Sequences

Precalculus

Description	*Course Numbers*
1) Algebra and trigonometry to prepare students for calculus	Mathematics 109* or Agriculture and Life Sciences 5*
2) Algebra, analytic geometry, elements of calculus	Agriculture and Life Sciences 115**

*Mathematics 109 and ALS 5 do not carry credit for graduation.

**Students who want a second semester of mathematics after ALS 115 may take Mathematics 105 or if they need more calculus, 111.

Calculus

Description	*Mathematics Course Numbers*
1) Standard three-semester sequence for students who do not expect to take advanced courses in mathematics	111–112–213
2) Usual sequence for prospective mathematics majors and others who expect to take advanced courses in mathematics	111–122–221–222
3) Calculus for engineers (also taken by some physical science majors)	191–192–293–294

Mathematics 191 may be substituted for 111 in sequences 1 and 2. Sequences 2 and 3 are two-year sequences that include some linear algebra.

Students who take sequence 1 may learn some linear algebra by taking Mathematics 231. A student whose performance in 112 is exceptional may switch to sequence 2 and take 221.

Special-Purpose Sequences

Description	*Mathematics Course Numbers*
1) Finite mathematics and calculus for biology majors	105–106
2) Other possible finite mathematics and calculus sequence	105–111

Students who want to take two semesters of calculus are advised to take the first two semesters of one of the three calculus sequences. It is also possible to follow Mathematics 106 with 112 or 122.

Switching between calculus sequences is often difficult, especially at the 200-level. Students should not attempt such a switch without consulting the associate chair.

Courses with Overlapping Content

Because the department offers many courses with overlapping content, students must choose their courses carefully to ensure that they will receive credit for each course they take. Listed below are groups of courses with similar content. Students will receive credit for only one of the courses in each group.

	213 and 294
106, 111, 191	213 and 222
112, 122, and 192	221, 293, and 231
	332 and 432
213 and 293	372 and 472

Fees

In some courses there may be a small fee for photocopying materials to be handed out to students.

Basic Sequences

MATH 105 Finite Mathematics for Biologists (also Theoretical and Applied Mechanics 105)
Fall or summer. 3 credits. Prerequisite: three years of high school mathematics, including trigonometry and logarithms.
Mathematical modeling, sets, functions, and graphing (including use of log and semi-log paper). Probability (with some applications to genetics). Matrices, systems of linear equations, and Markov chains. Examples from biology are used.

MATH 106 Calculus for Biologists
Spring. 3 credits. Prerequisite: Mathematics 105 or 109 or ALS 115 or permission of instructor. (A strong background in functions is required.) Mathematics 111, rather than 106, is recommended for those planning to take 112.*
Introduction to differential and integral calculus, partial derivatives, elementary differential equations. Examples from biology are used.

MATH 109 Precalculus Mathematics
Summer. 3 transcript credits only; cannot be used toward graduation.
This course is designed to prepare students for Mathematics 111. Algebra, trigonometry, logarithms, and exponentials are reviewed.

MATH 111 Calculus
Fall, spring, or summer. 4 credits. Limited to 22 students a section. Prerequisite: Mathematics 109 or three years of high school mathematics, including trigonometry.*
Plane analytic geometry, differentiation and integration of algebraic and trigonometric functions, applications of differentiation, logarithmic and exponential functions.

MATH 112 Calculus
Fall, spring, or summer. 4 credits. Limited to 22 students a section. Prerequisites: Mathematics 106 or 111 with a grade of C or better. Those who do extremely well in Mathematics 111 should take 122 instead of 112, unless they plan to continue with 213.*
Methods and applications of integration, plane curves and polar coordinates, vectors and solid analytic geometry, introduction to partial derivatives, infinite series.

MATH 121 Honors Calculus
Fall or spring. 4 credits. Limited to 22 students per section. Prerequisite: Three years of high school mathematics, including calculus.
This is a first-semester honors course in calculus intended for students who have had calculus in high school. The course material will be the same as that in Math 111, but it will be covered in greater depth.

MATH 122 Calculus
Fall or spring. 4 credits. Prerequisite: performance at a high level in Mathematics 111 or permission of the department.
Students planning to continue with Mathematics 213 are advised to take 112 instead of this course.*
Differentiation and integration of elementary transcendental functions, the techniques of integration, applications, polar coordinates, infinite series, and complex numbers, as well as an introduction to proving theorems. The approach is more theoretical than in Mathematics 112.

MATH 191 Calculus for Engineers
Fall. 4 credits. Limited to 25 students per section. Prerequisite: three years of high school mathematics, including trigonometry.*
One section will be taught with computer experimentation, and will carry an extra credit.
Plane analytic geometry, differential and integral calculus, and applications.

MATH 192 Calculus for Engineers
Fall, spring, or summer. 4 credits. Prerequisite: Mathematics 191.*
Methods of integration, hyperbolic functions, polar coordinates, infinite series, complex numbers, introduction to partial derivatives, introduction to surface and volume integrals.

MATH 213 Calculus
Fall or spring. 4 credits. Prerequisite: Mathematics 112, 122, or 192.*
Vectors, vector-valued functions, line integrals. Multivariable calculus, multiple integrals. First- and second-order differential equations with applications. Introduction to numerical methods, series solutions, systems of differential equations, elementary partial differential equations.

MATH 221 Linear Algebra and Calculus
Fall or spring. 4 credits. Prerequisite: Mathematics 122 with a grade of B or better, or permission of instructor.*
Linear algebra and differential equations. Topics include vector algebra, linear transformations, matrices, linear differential equations, as well as an introduction to proving theorems.

MATH 222 Calculus
Fall or spring. 4 credits. Prerequisite: Mathematics 221.*
Vector differential calculus, calculus of functions of several variables, multiple integrals.

MATH 293 Engineering Mathematics
Fall, spring, or summer. 4 credits. Prerequisites: Mathematics 192 plus a knowledge of computer programming equivalent to that taught in Engineering Common Courses 100. In exceptional circumstances, Mathematics 192 and 293 may be taken concurrently.*
Introduction to physical vectors, linear algebra and matrix theory, inner product spaces. Includes computer use in solving problems.

MATH 294 Engineering Mathematics
Fall, spring, or summer. 4 credits. Prerequisite: Mathematics 293.*
Systems of linear ordinary differential equations, introduction to ordinary differential equations. Vector fields and vector calculus. Introduction to boundary-value problems and Fourier series. Includes computer use in solving problems.

General Courses

MATH 101 History of Mathematics #
Summer. 4 credits. Prerequisite: three years of high school mathematics.
The history of the main ideas of mathematics from Babylonian, Egyptian, and Greek times to the present day.

MATH 103 Mathematical Explorations
Spring. 3 credits. Limited to 15 students. This course may be used to satisfy the distribution requirement in mathematics.
This course is for students who wish to experience how mathematical ideas naturally evolve; especially for students who have not yet found mathematics to be a world in which they move comfortably. The homework will consist in the students actively investigating mathematical ideas such as the nature of infinity and geometric reality and the ideas leading to calculus. The course will emphasize ideas and imagination as opposed to techniques and calculations.

[MATH 104 Mathematics and Art
Fall. 3 credits. Limited to 12 students. Does not satisfy the mathematics distribution requirement; for graduation credit only. Not offered 1992–93.
The impact of mathematical ideas on the arts and the impact of the arts on mathematical ideas through the ages, with a special emphasis on theories of perspective in the visual arts. The course will be cooperatively taught by a mathematician and an art historian. There will be both mathematical and artistic assignments based on the theories, and assignments of readings from the original texts.]

[MATH 117 Foundations of Calculus
3 credits. Limited to 18 students. Not offered 1992–93. Prerequisite: Mathematics 111 or 106 or equivalent. May be used toward the mathematics distribution requirement.
Intended either for nonscientists who will not need the conventional second-semester calculus course or for future math or science majors who would like to deepen their understanding before going on in calculus. This course delves into the questions concerning limits and infinite processes that puzzled scholars for over two thousand years. Students study anew the real number system, the theory of limits, continuity, differentials, derivatives, and the definite integral. The pedagogical method is partly historical, viewing the development of these interlocked topics from the time of the ancient Greeks (Zeno's paradoxes, the discovery of irrationals, Eudoxus' Method of Exhaustion, and the work of Archimedes) through the seventeenth-century work of Fermat, Newton, and Leibniz and into modern times. Readings of excerpts from original manuscripts are compared with the descriptions of the same material given in a standard beginning calculus book.]

MATH 123 Analytic Geometry and Calculus
Summer. 4 credits. Prerequisite: High school mathematics through trigonometry and plane analytic geometry.
The honors section of Math 111. Covers the same topics more deeply (at the level of Apostol's *Calculus*).

MATH 150 From Space to Geometry
Fall. 3 credits. Enrollment limited to 18 students.
Over the centuries mathematicians have interpreted the concept of "space" in numerous ways. This course will survey some of these approaches from the time of Euclid to the later perspective of non-Euclidean systems. We will evaluate the impact of these viewpoints on such concepts as distance, angle measurement, straightness and curvature, dimension, and surface. We will make and analyze models to get a feel for the

*See the list of courses with overlapping content at the end of the introduction.

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concepts and to assess the relevance of various approaches to geometry.

[MATH 151 The Geometry of Tilings, Polyhedra, and Structural Engineering
Spring. 3 credits. Limited to 15 students. Not offered 1992–93.
An introduction to topics in geometry, including the classification of tilings by the group of symmetries that act on them, examples of artists such as Escher, the aperiodic tilings of R. Penrose, the study of polyhedra, Euler's formula, regular polyhedra, linkages that draw straight lines, "Buckminster Fuller's" geodesic domes, and tensegrities. Emphasis will be on the geometric ideas involved, with formal proofs studied only as needed for overall understanding.]

[MATH 200 Basic Concepts of Mathematics
Summer. 3 credits. Prerequisite: a good knowledge of high school mathematics, including trigonometry. Not offered 1992–93.
Discussion of basic ideas in mathematics drawn from algebra and topology. An example of the problems treated is the proof of the impossibility of trisecting an angle by ruler and compass. Suitable for teachers, prospective teachers, and high school students with a strong interest in mathematics.]

[MATH 227 Mathematical Model Modeling
Spring. 4 credits. Limited to 25 students. Not offered 1992–93. Prerequisite: Mathematics 111 or 106 or equivalent. May be used to satisfy the mathematics distribution requirement. Not intended for upperclass science majors.
Mathematical modeling is the process of bringing mathematical methods to bear on problems arising in the real world. In this course students will study selected mathematical models, learn general modeling techniques, and gain experience in constructing original mathematical models and comparing their predictions with reality, both to appreciate the usefulness of mathematical models and to be aware of their limitations.]

MATH 403 History of Mathematics #
Spring. 4 credits. Prerequisites: two courses in mathematics above 300, or permission of instructor.
Survey of the development of mathematics from antiquity to the present, with an emphasis on the achievements, problems, and mathematical viewpoints of each historical period and the evolution of such basic concepts as number, geometry, construction, and proof. Readings from original sources in translation. Students will be required to give oral and written reports.

[MATH 408 Mathematics in Perspective
Spring. 4 credits. Not offered 1992–93. Prerequisite: consent of instructor (intended for senior mathematics majors and other students with strong mathematics backgrounds).
The purpose of this course is for students to step back and to form an overview of the mathematics they have learned.]

MATH 490 Supervised Reading and Research
Fall, spring, or summer. 1–6 credits.
Supervised reading and research by arrangement with individual professors. Not applicable for material currently available in regularly scheduled courses.

MATH 508 Mathematics for Secondary School Teachers
Fall, spring, or summer. 1–6 credits. Prerequisite: secondary school mathematics teacher, graduate standing, or permission of instructor. May not be taught every semester.
An examination of the principles underlying the content of the secondary school mathematics curriculum, including connections with the history of mathematics and current mathematics research.

MATH 690 Supervised Reading and Research
Variable credit (maximum 6 each term).

Analysis

MATH 411–412 Introduction to Analysis
411, fall; 412, spring. 4 credits each term. Prerequisite: Mathematics 222. Students who need measure theory and Lebesgue integration for advanced probability courses should take Mathematics 413–414 or arrange to audit the first few weeks of Mathematics 521. Undergraduates who plan to attend graduate school in mathematics should take 413–414.
An introduction to the theory of functions of real variables, stressing rigorous logical development of the subject rather than technique of applications. Topics include Euclidean spaces, the real number system, continuous and differentiable functions, Riemann integral, uniform convergence and approximation theorems, Fourier series, calculus in several variables, and differential forms.

MATH 413–414 Introduction to Analysis
413, fall; 414, spring. 4 credits each. Prerequisite: Mathematics 222.
Honors version of Mathematics 411–412. Metric spaces are included in Mathematics 413, and 413 proceeds at a faster pace than 411. The second semester includes an introduction to the Lebesgue integral.

MATH 418 Introduction to the Theory of Functions of One Complex Variable
Spring. 4 credits. Prerequisite: Mathematics 222 or 294 or 213. May be offered only in alternate years.
A rigorous introduction to complex variable theory. Complex numbers. Differential and integral calculus for functions of a complex variable, including Cauchy's theorem and the calculus of residues. Elements of conformal mapping.

Applied Mathematics and Differential Equations

MATH 421 Applicable Mathematics
Fall, spring, or summer. 4 credits. Prerequisites: high level of performance in Mathematics 294, or 221 and 222, or 213 and 231. Graduate students who need mathematics extensively in their work and who have had a solid advanced calculus course and complex variables course as undergraduates should take Mathematics 515–516. With less preparation, they should take Mathematics 421–422–423.
Theorems of Stokes, Green, Gauss, etc. Sequences and infinite series. Fourier series and orthogonal functions. Ordinary differential equations. Solution of partial differential equations by separation of variables.

MATH 422 Applicable Mathematics
Fall, spring, or summer. 4 credits. Prerequisite: Mathematics 421.
Complex variables Fourier transforms, Laplace transforms. An introduction to generalized functions. Applications to partial differential equations.

MATH 423 Applicable Mathematics
Spring. 4 credits. Prerequisite: Mathematics 421; however, students who have not taken 422 should talk to the instructor before taking this course.
Normed vector spaces. Elementary Hilbert space theory. Projections. Fredholm's alternative. Eigenfunction expansions. Applications to elliptic partial differential equations and to integral equations.

MATH 425 Numerical Solutions of Differential Equations
Spring. 4 credits. Prerequisites: Mathematics 222 or 294, one course numbered 300 or higher in mathematics, and Computer Science 321, or permission of instructor. This course is a natural sequel to Computer Science 321.
Methods and basic theory for the numerical solution of ordinary and partial differential equations. Linear multistep methods, Runge-Kutta methods, and the problem of stiffness for ordinary differential equations. Finite difference methods and Galerkin finite element methods for partial differential equations. Homework will involve use of a computer.

[MATH 427 Introduction to Ordinary Differential Equations
Fall. 4 credits. Prerequisite: Mathematics 222 or 294 or permission of instructor. Not offered 1992–93.
Covers the basic existence, uniqueness, and stability theory together with methods of solution and methods of approximation. Topics include singular points, series solutions, Sturm-Liouville theory, transform methods, approximation methods, and application to physical problems.]

MATH 428 Introduction to Partial Differential Equations
Spring. 4 credits. Prerequisite: Mathematics 222 or 294 or permission of instructor.
Topics selected from first-order quasilinear equations, classification of second-order equations, with emphasis on maximum principles, existence, uniqueness, stability Fourier series methods, approximation methods.

Algebra

MATH 231 Linear Algebra
Spring. 3 credits. Prerequisite: Mathematics 111 or equivalent.*
Vectors, matrices, and linear transformations, affine and Euclidean spaces, transformation of matrices, and eigenvalues.

MATH 332 Algebra and Number Theory
Fall. 4 credits. Prerequisites: one year of calculus and one course from Mathematics 221, 231, and 294. Mathematics 332 does not satisfy prerequisites for courses numbered 500 and above.*
Various topics from modern algebra and number theory, usually including rings, fields, and finite groups. Motivation and examples are derived mostly from geometry, arithmetic, and congruence problems on the integers.

*See the list of courses with overlapping content at the end of the introduction.

MATH 336 Applicable Algebra
Spring. 4 credits. Prerequisites: Mathematics 221, 294, or 231.
An introduction to concepts and methods of abstract algebra that are of importance in science and engineering. Applications of the theory to concrete problems will be stressed. Each year the course will treat aspects usually chosen from the following topics: partially ordered sets, lattices, graph theory, and Boolean algebras; finite machines and languages; applications of groups, fields, and modular arithmetic, such as Latin squares, elementary coding theory, or fast Fourier transform; difference equations. Additional topics may be chosen by the instructor.

MATH 431–432 Introduction to Algebra
431, fall or spring or summer; 432, spring. 4 credits each. Prerequisite: Mathematics 221 or 231. Undergraduates who plan to attend graduate school in mathematics should take 433–434.*
431: An introduction to linear algebra, including the study of vector spaces, linear transformations, matrices, and systems of linear equations; quadratic forms and inner product spaces; canonical forms for various classes of matrices and linear transformations; determinants. 432: an introduction to various topics in abstract algebra, including groups, rings, fields, factorization of polynomials and integers, congruences, and the structure of finitely generated modules over Euclidean domains with application to canonical forms of matrices.

MATH 433–434 Introduction to Algebra
433, fall; 434, spring. 4 credits each. Prerequisite: Mathematics 221 or 231. Honors version of Mathematics 431–432. Mathematics 433–434 will be more theoretical and rigorous than 431–432 and will include additional material such as multilinear and exterior algebra.

Geometry and Topology

MATH 451–452 Classical Geometries
451, fall or summer; 452, spring. 4 credits each term. Prerequisite: Mathematics 221 or 231 or permission of instructor. 451 is not usually a prerequisite for 452.
Foundations of geometry. Various geometric topics, including Euclidean, non-Euclidean, and projective geometry and rigidity theory.

MATH 453 Introduction to Topology
Fall. 4 credits. Prerequisites: Mathematics 411 and 221, or permission of instructor.
Basic point set topology, connectedness, compactness, metric spaces, fundamental group. Application of these concepts to surfaces such as the torus, the Klein bottle, the Moebius band.

MATH 454 Introduction to Differential Geometry
Spring. 4 credits. Prerequisites: Mathematics 222 or 294, plus at least one mathematics course numbered 300 or above. Mathematics 453 is not a prerequisite.
Differential geometry of curves and surfaces. Curvature, geodesics, differential forms. Introduction to n-dimensional Riemannian manifolds. This material provides some background for the study of general relativity; connections with the latter will be indicated.

*See the list of courses with overlapping content at the end of the introduction.

Probability and Statistics

MATH 171 Statistical Theory and Application in the Real World
Fall or spring. 4 credits. Prerequisites: high school mathematics.
This introductory statistics course will discuss techniques for analyzing data occurring in the real world and the mathematical and philosophical justification for these techniques. Topics include population and sample distributions, central limit theorem, and statistical theories of point estimation, confidence intervals, and testing hypotheses, the linear model, and the least squared estimator. The course concludes with a discussion of tests and estimates for regression and analysis of variance (if time permits). The computer will be used to demonstrate some aspects of the theory, such as sampling distributions and the Central Limit Theorem. In the lab portion of the course, students will learn and use computer-based methods for implementing the statistical methodology presented in the lectures. (No previous familiarity with the computer is presumed.)

MATH 372 Elementary Statistics
Fall. 4 credits. Prerequisites: one year of calculus, and Computer Science 100 or 101 or 108 or permission of instructor. A terminal course for students who will take no further courses in statistics.*
Introduction to the principles underlying modern statistical inference, to the practical application of statistical techniques, and to the rationale underlying the choice of statistical methods in various situations. Topics in probability that are essential to an understanding of statistics. Homework involves statistical analysis of data sets on hand calculators and on a computer by means of packaged programs.

MATH 471 Basic Probability
Fall. 4 credits. Prerequisite: Mathematics 221. May be used as a terminal course in basic probability. Intended primarily for those who will continue with Mathematics 472.
Topics include combinations, important probability laws, expectations, moments, moment-generating functions, limit theorems. Emphasis is on diverse applications and on development of use in statistical applications. See also the description of Mathematics 571.

MATH 472 Statistics
Spring. 4 credits. Prerequisite: Mathematics 471 and knowledge of linear algebra such as taught in Mathematics 221. Some knowledge of multivariate calculus helpful but not necessary.*
Classical and recently developed statistical procedures are discussed in a framework that emphasizes the basic principles of statistical inference and the rationale underlying the choice of these procedures in various settings. These settings include problems of estimation, hypothesis testing, large sample theory.

[MATH 473 Further Topics in Statistics
Fall. 4 credits. Prerequisite: Mathematics 472 or 574. Not offered 1992–93.
More detailed discussion of some of the topics not covered at length in Mathematics 472. Design and analysis of experiments. Multivariate analysis. Nonparametric inference; robustness. Sequential analysis. For corresponding subject matter taught in more detail, see description of Mathematics 573 and 675.]

*See the list of courses with overlapping content at the end of the introduction.

Mathematical Logic

MATH 481 Mathematical Logic (also Philosophy 431)
Fall. 4 credits. Prerequisite: Mathematics 221.
Propositional and predicate logic. Classical proof procedures. Completeness and compactness. Decidability and undecidability. The Godel incompleteness theorem. Elements of set theory.

[MATH 483 Intensional Logics and Alternatives to Classical Logics (also Philosophy 436)
Spring. Prerequisite: Philosophy 231 or equivalent or any mathematics or computer science logic course or permission of instructor. Not offered 1992–93.
Topics: (1) The abstract concept of consequence. What makes a logic intensional? (2) Sentential logics: soundness and completeness for some normal modal and tense logics, intuitionistic logic, the Stalnaker, D. Lewis, and Adams conditionals; incomplete modal logics; the correspondence problem. (3) Predicate (first-order) logics: soundness and completeness for classical free logic and some normal modal logics; the Barcan and converse-Barcan schemes; actuality and two-dimensional semantics; the interpolation problem. (4) Time permitting, topics from among the following: non-normal modal logics; additional semantics for intuitionistic logic; 3-valued logics; individual-actualism; higher-order logics, dynamic logic; auto-epistemic logic and non-monotone inference; decision problems associated with some of these logics.]

[MATH 486 Applied Logic (also Computer Science 486)
Fall. 4 credits. Prerequisites: Mathematics 222 or 294, Computer Science 100, and some additional course in mathematics or Computer Science 381. Not offered 1992–93.
T R 10:10–11:25, plus one-hour lab to be arranged.
Propositional and predicate logic, compactness and completeness by tableaux. Equational logic. Herbrand Universes, the resolution method, and unification. Rewrite rules and equational logic. Knuth-Bendix method and the congruence closure algorithm and lamda-calculus reduction strategies. Restrictions on resolution and their completeness. Introduction to automatic theorem proving. Topics in Prolog, Lisp, or ML on microcomputers or, possibly, exposure to a larger system such as Nuprl. Input resolution and Prolog. Applications to expert systems and program verification.]

MATH 487 Applied Logic II
Spring. 4 credits. Prerequisite: Mathematics 221 or equivalent.
Intuitionistic propositional and predicate logic. Natural deduction and tableaux as proof procedures. Curry partial application structures. Their polynomial extensions as lambda calculi. Typed and untyped lambda calculi, cartesian closed categories. Heyting semantics of constructions as interpretations in partial combinatory structures, Kleene realizabilities. Curry-Howard isomorphisms. Intuitionistic first order arithmetic and Godel's system T. Intuitionistic higher order logic and

polymorphism. Weak and strong nomalizations for simple and polymorphic calculi. Application to consistency proofs. Term extraction as the context for understanding compilers and interpreters for applicative languages such as LISP, NUPRL, MIRANDA, etc.

Graduate Courses

Students interested in taking graduate courses in mathematics should consult the department for further course details, times, and possible changes in courses as described below.

[MATH 503 History of Mathematics
4 credits. Prerequisites: Mathematics 511 and 531. Intended for graduate students in the mathematical sciences. Not offered 1992–93.
This course will be devoted to the history of mathematics in the nineteenth century from the original sources, with emphasis on the history of the foundations of analysis and of the foundations of commutative algebra. Typical authors in algebra who will be studied are Lagrange, Ruffini, Gauss, Abel, Galois, Dirichlet, Kummer, Kronecker, Dedekind, Weber, M. Noether, Hilbert, Steinitz, Artin, and E. Noether. Typical authors in analysis who will be studied are Cauchy, Fourier, Bolzano, Dirichlet, Riemann, Weierstrass, Heine, Cantor, Peano, and Hilbert. If time permits, a sketch will be given of the history of probability and statistics from Bernoulli to Pearson. Students will be required to read and explain one important nineteenth-century paper.]

MATH 511–512 Real and Complex Analysis
511, fall; 512, spring.
511: measure and integration, functional analysis. 512: complex analysis, Fourier analysis, and distribution theory.

MATH 513–514 Topics in Analysis
513, fall; 514, spring.

MATH 515–516 Mathematical Methods in Physics
515, fall; 516, spring. 4 credits each.
Intended for graduate students in physics or related fields who have had a strong advanced calculus course and at least two years of general physics. A knowledge of the elements of finite dimensional vector space theory, complex variables, separation of variables in partial differential equations, and Fourier series will be assumed. The course overlaps with parts of Mathematics 421–422–423. Undergraduates will be admitted only with permission of instructor. Mathematics 515 is a prerequisite for 516.
Topics designed to give a working knowledge of the principal mathematical methods used in advanced physics. A brief discussion of some basic notions: metric space, vector space, linearity, continuity, integration. Generalized functions (Schwartz distributions). Fourier series and Fourier integrals. Saddle point method. Linear operators. Differential operators and integral operators, the equations and eigenvalue problems connected with them and the special functions arising from them. Elements of group theory. The rotation group and its representations.

[MATH 517 Dynamical Systems
Fall. Not offered 1992–93.
Topics: Existence and Uniqueness Theorems for ODEs. Poincaré-Bendixon theorem and global properties of two dimensional flows. Limit sets, non-wandering sets, chain recurrence, pseudo-orbits and structural stability. Linearization at equilibrium points: stable manifold theorem and the Hartman-Grobman theorem. Generic properties: transversality theorem and the Kupka-Smale theorem. Examples: expanding maps and Anosov diffeomorphisms. Hyperbolicity: the horseshoe and the Birkhoff-Smale theorem on transversal homoclinic orbits. Rotation numbers: Herman's theorem. Characterization of structurally stable systems.]

[MATH 518 Smooth Ergodic Theory
Spring. Not offered 1992–93.
Topics: Invariant measures. Entropy. Hausdorff dimension and related concepts. Hyperbolic invariant sets: Stable manifolds, Markov partitions and symbolic dynamics. Equilibrium measures of hyperbolic attractors. Ergodic theorems. Pesin theory: stable manifolds of non-hyperbolic systems. Liapunov exponents: relations between entropy, exponents and dimensions.]

MATH 519–520 Partial Differential Equations
519, fall; 520, spring.
Basic theory of partial differential equations.

MATH 521 Measure Theory and Lebesgue Integration
Fall.
Measure theory, integration, and Lp spaces.

MATH 522 Applied Functional Analysis
Spring.
Basic theory of Hilbert and Banach spaces and operations on them. Applications.

MATH 531–532 Algebra
531, fall; 532, spring.
531: finite groups, field extensions, Galois theory, rings and algebras, tensor and exterior algebra. 532: Wedderburn structure theorem, Brauer group, group cohomology, Dedekind domains, primary decomposition, Hilbert basis theorem, local rings.

MATH 537 Analytic Number Theory
Fall. Prerequisites: Math 511, 521, 431.
Topics: The Prime Number Theorem. Primes in Arithmetic Progressions. The Large Sieve and Some of its Applications.

MATH [549]–550 Lie Groups and Lie Algebras
549, fall; 550, spring. 549 not offered 1992–93. Prerequisites: 413–414 and 431–432 or equivalent. This is a year-long introduction to the theory of Lie groups and their representation theory for beginning graduate students.
Topics: Topological groups. Lie groups. Relation between Lie algebras and Lie groups; exponential map. Homogeneous manifolds. Compact groups and their representation theory. Enveloping algebras and invariant differential operators. Structure of root systems, Coxeter groups. Classification of simple Lie algebras and Lie groups. More advanced topics: quantum groups, Kac-Moody algebras.

MATH 551 Introductory Algebraic Topology
Spring.
Fundamental group and covering spaces. Homology theories for complexes and spaces.

MATH 552–553 Differentiable Manifolds
552 fall, 553 spring. Prerequisites: advanced calculus, linear algebra (Mathematics 431), point set topology (Mathematics 453). This is a year-long introduction to differential topology and differential geometry at the level of the beginning graduate student.
Topological manifolds. Smooth manifolds, immersions and embeddings, tangent bundles, fiber bundles, vector fields and dynamical systems, Froebenius' theorem. Lie groups. Integration on manifolds, differential forms, Stokes theorem. Tubular neighborhoods, transversality and cobordism. Connections, Riemannian manifolds, geodesics, curvature, Gauss-Bonnet theorem.

[MATH 561 Geometric Topology
Topics from general topology. Introduction to geometric properties of manifolds. Not offered 1992–93.]

MATH 571–572 Probability Theory
571, fall; 572, spring. Prerequisite: a knowledge of Lebesgue integration theory, at least on the real line. Students can learn this material by taking parts of Mathematics 413–414 or 521.
Properties and examples of probability spaces. Sample space, random variables, and distribution functions. Expectation and moments. Independence, Borel-Cantelli lemma, zero-one law. Convergence of random variables, probability measures, and characteristic functions. Law of large numbers. Selected limit theorems for sums of independent random variables. Markov chains, recurrent events. Ergodic and renewal theorems. Martingale theory. Brownian motion and processes with independent increments.

MATH 571–574 Probability and Statistics
571, fall; 574, spring. This course is a prerequisite to all advanced courses in statistics.
571: same as Mathematics 571 above.
574: topics include an introduction to the theory of point estimation, consistency, efficiency, sufficiency, and the method of maximum likelihood; the classical tests of hypotheses and their power; the theory of confidence intervals; the basic concepts of statistical decision theory; the fundamentals of sequential analysis. Intended to furnish a rigorous introduction to mathematical statistics.

MATH 573 Experimental Design, Multivariate Analysis
Fall.
Rationale for selection of experimental designs and algorithms for constructing optimum designs. Optimum properties and distribution theory for classical analysis of variance procedures and their simplest multivariate analogues.

[MATH 575 Sequential Analysis, Multiple Decision Problems
Fall. Not offered 1992–93. Prerequisite: a course in mathematical statistics such as Mathematics 574.]

[MATH 577 Nonparametric Statistics
Fall. Not offered 1992–93.
A study of nonparametric techniques, especially order statistics, rank order statistics, scores, local optimality properties, and perhaps some asymptotic theory.]

MATH 581 Logic
Spring.
Basic topics in mathematical logic, including propositional and predicate calculus; formal number theory and recursive functions; completeness and incompleteness theorems.

MATH 611–612 Seminar in Analysis
611, fall; 612, spring.

MATH 613 Functional Analysis
Spring.
Topological vector spaces. Banach and Hilbert spaces, Banach algebras. Additional topics to be selected by instructor.

[MATH 615 Fourier Analysis
Spring. Not offered 1992–93.]

MATH 617 Applied Dynamical Systems (also T&AM 777)
Fall. 3 credits. Suggested prerequisite: T&AM 675, Mathematics 517, or equivalent. Review of planar (single-degree-of-freedom) systems. Local and global analysis. Structural stability and bifurcations in planar systems. Center manifolds and normal forms. The averaging theorem and perturbation methods. Melnikov's method. Discrete dynamical systems, maps and difference equations, homoclinic and heteroclinic motions, the Smale Horseshoe and other complex invariant sets. Global bifurcations, strange attractors, and chaos in free and forced oscillator equations. Applications to problems in solid and fluid mechanics.

[MATH 622 Riemann Surfaces
Fall. Not offered 1992–93.]

[MATH 623 Several Complex Variables
Not offered 1992–93.]

[MATH 627–628 Seminar in Partial Differential Equations
627, fall; 628, spring. Not offered 1992–93.]

MATH 631–632 Seminar in Algebra

MATH 635 Topics in Algebra
Spring.
Selection of advanced topics from algebra, algebraic number theory, and algebraic geometry. Course content varies.

[MATH 637 Algebraic Number Theory
Spring. Not offered 1992–93.]

MATH 639 Topics in Algebra II
Fall.
Selection of advanced topics from algebra, algebraic number theory, and algebraic geometry. Course content varies.

MATH 640 Homological Algebra
Spring.

MATH 651–652 Seminar in Topology
651, fall; 652, spring.

MATH 653–654 Algebraic Topology
653, fall; 654, spring.
Duality theory in manifolds, applications, cohomology operations, spectral sequences, homotopy theory, general cohomology theories, categories and functors.

[MATH 655 Mathematical Foundations for Computer Modeling and Simulation (also Computer Science 655)
Spring. 4 credits. Prerequisites: Mathematics 431 and 432 or the equivalent, both in content and in the level of mathematical sophistication, or permission of instructors. Not offered 1992–93.
This course will have two parts, one purely mathematical, the other applied. The former is intended to introduce students to theoretical tools that are relevant to the study of robotics, solid modeling, and simulation. These tools will be drawn from the areas of (real and complex) algebraic geometry, topology, differential geometry, and differential equations. The latter part of the course will provide applications that illustrate uses of the mathematics and point the way to needed further developments.]

MATH 657–658 Advanced Topology
657, fall; 658, spring.
Selection of advanced topics from modern algebraic, differential, and geometric topology. Course content varies.

MATH [661]–662 Seminar in Geometry
661, fall; 662, spring. 661 not offered 1992–93.

[667 Algebraic Geometry
Fall. Not offered 1992–93.]

MATH 670 Topics in Statistics
Spring.
A course taught occasionally to cover special topics in theoretical statistics not treated in other listed courses. Typical of the subjects that will be treated are time series analysis, and classification and cluster analysis.

MATH 671–672 Seminar in Probability and Statistics

[MATH 674 Multivariate Analysis
Spring. Not offered 1992–93.]

[MATH 675 Statistical Decision Theory
Spring. Not offered 1992–93.]

MATH 677–678 Stochastic Processes
677, fall; 678, spring.

MATH 681–682 Seminar in Logic
681, fall; 682, spring.

MATH 683 Model Theory
Spring.

MATH 684 Recursion Theory
Fall.
Theory of effectively computable functions. Classification of recursively enumerable sets. Degrees of recursive unsolvability. Applications to logic. Hierarchies. Recursive functions of ordinals and higher type objects. Generalized recursion theory.

[MATH 685 Topics in Logic
Fall. Not offered 1992–93.
Topics in metamathematics. Course content varies.]

[MATH 687 Set Theory
Spring. Not offered 1992–93.
Models of set theory. Theorems of Gödel and Cohen, recent independence results.]

MATH 688 Automated Theorem Proving
Fall.

MATH 701–702 Oliver Club Seminar

MATH 703–704 Olivetti Club Seminar

MATH 707–708 Seminar in Mathematics Education

MATH 711–712 Seminar in Analysis

MATH 713 Seminar in Analytic Dynamics

MATH 727–728 Seminar in Numerical Analysis

MATH 731–732 Seminar in Algebra

MATH 733–734 Seminar in Computational Algebra

MATH 749–750 Seminar in Lie Groups

MATH 751–752 Topics in Geometry and Topology

MATH 767–768 Seminar in Combinatorial and Algebraic Geometry

MODERN LANGUAGES AND LINGUISTICS

J. Bowers, chair; J. Lantolf, associate chair (314 Morrill Hall); J. Gair, graduate faculty representative (407 Morrill Hall); C. Rosen, director of undergraduate studies (311 Morrill Hall); W. Browne, V. Carstens, G. Chierchia, N. Clements, A. Cohn, M. Diesing, G. Diffloth, W. Harbert, J. Jasanoff, A. Jongman, F. Landman, R. Leed, B. Lust, S. McConnell-Ginet, A. Nussbaum, M. Suñer, L. Waugh, J. Whitman, J. Wolff, D. Zec

The Department of Modern Languages and Linguistics offers courses in linguistics (the study of the general nature, structure, and history of language) and elementary, intermediate, and advanced courses in many of the languages of Europe, Africa, and south, southeast, and east Asia.

Most courses in modern languages and linguistics are offered by the Department of Modern Languages and Linguistics; see listings below under individual language names (e.g., Spanish) and under Linguistics. Courses in foreign language literatures and certain language courses as well are taught in the following departments; consult entries under the department name for course listings.

Africana Studies and Research Center: Ewe, Swahili

Asian Studies: Chinese, Japanese, Korean, Vietnamese

Classics: Greek, Latin, Sanskrit

German Studies: German

Near Eastern Studies: Akkadian, Arabic, Aramaic, Hebrew, Turkish

Romance Studies: French, Italian, Spanish

Russian Literature: Russian

The Full-year Asian Language Concentration (FALCON Program) offers intensive instruction in Chinese, Japanese, or Indonesian to students wishing to gain fluency in the language in a single year.

Arabic

See listings under Near Eastern Studies.

Bengali

Fees. A small fee may be charged for photocopied texts for course work.

BENGL 121–122 Elementary Bengali
121, fall; 122, spring. 4 credits each term. Prerequisite: for Bengali 122, Bengali 121 or examination.
D. Sudan.
The emphasis is on basic grammar, speaking, and comprehension skills; Bengali script will also be introduced.

BENGL 201–202 Intermediate Bengali Reading @
201, fall; 202, spring. 3 credits each term. Prerequisites: for Bengali 201, Bengali 122 or examination; for Bengali 202, Bengali 201 or examination.
D. Sudan.
Continuing instruction in grammar with attention to speaking and reading skills.

BENGL 203–204 Intermediate Bengali Composition and Conversation @
203, fall; 204, spring. 3 credits each term. Prerequisites: for Bengali 203, Bengali 122 or examination; for Bengali 204, Bengali 203 or examination.
D. Sudan.
Continuing instruction in grammar with attention to writing skills.

BENGL 303–304 Bengali Literature I, II
303, fall; 304, spring. 4 credits each term. Prerequisites: Bengali 203–204 or equivalent.
D. Sudan.
An introduction to noted Bengali writers. Selections of works by Rabindranath Tagore and Abanindranath Tagore and short stories by Bonophul will be covered. The course will be devoted to reading these works and developing literary criticism and creative writing in Bengali.

Burmese

NOTE: Check at Morrill 416 and Morrill 404 before classes begin for placement and other testing, and organizational information; or contact J. Wheatley in Morrill 416 (255-9301).

Fees. A small fee may be charged for photocopied texts for course work.

BURM 101–102 Elementary Burmese
101, fall; 102, spring. 6 credits each term. Prerequisite: for Burmese 102, Burmese 101 or equivalent. Satisfactory completion of Burmese 102 fulfills the qualification portion of the language requirement.
J. Wheatley and staff.
A course for beginners or for those who have been placed in the course by examination. The course gives a thorough grounding in speaking and reading.

BURM 201–202 Intermediate Burmese Reading @
201, fall; 202, spring. 3 credits each term. Prerequisites: for Burmese 201, Burmese 102; for Burmese 202, Burmese 201.
J. Wheatley and staff.
Continuing instruction in spoken and written Burmese.

BURM 203–204 Burmese Composition @
203, fall; 204, spring. 3 credits each term. Prerequisite: permission of instructor.
J. Wheatley and staff.
Letter writing and other forms of composition.

BURM 301–302 Advanced Burmese Reading @
301, fall; 302, spring. 4 credits each term. Prerequisites: for Burmese 301, Burmese 202 or permission of instructor; for Burmese 302, Burmese 301.
J. Wheatley and staff.
Continuing instruction in spoken and written Burmese; emphasis on enlarging vocabulary, increasing reading speed, and reading various genres and styles of prose.

BURM 401–402 Burmese Directed Independent Study
Fall or spring. 4 credits each term. Prerequisite: permission of instructor.
J. Wheatley and staff.
Various topics according to need.

Cambodian

See Khmer.

Cebuano (Bisayan)

Fees. A small fee may be charged for photocopied texts for course work.

CEBU 101–102 Elementary Cebuano
101, fall; 102, spring. Offered according to demand. 6 credits each term. Prerequisite for Cebuano 102: Cebuano 101 or equivalent.
J.U. Wolff and staff.
A semi-intensive course for beginners.

Chinese

For literature courses [conducted in English or Chinese] and Classical Chinese, see Asian Studies.

NOTE: Check the Chinese bulletin boards near Morrill 416 for information on testing, classes, etc., before classes begin. Placement tests [for those who do not know which course they qualify for] are given the week before classes begin, both fall and spring. Qualification and proficiency testing is done the week before classes begin in the fall only.

Fees. Depending on the course, a small fee may be charged for photocopied texts for course work.

CHIN 101–102 Elementary Mandarin
101, fall; 102, spring. 6 credits each term. Prerequisite for Chinese 102: Chinese 101 or equivalent. Satisfactory completion of Chinese 102 fulfills the qualification portion of the language requirement.
J. Wheatley and staff.
A course for beginners or those who have been placed in the course by examination. The course gives a thorough grounding in speaking and reading skills. Students with some facility in the spoken language [because Chinese is spoken at home] but who do not read [characters] should take 109/110. Students who read Chinese, but who speak 'dialects,' such as Cantonese or Amoy, should see the program director in Morrill 416 before enrolling.

CHIN 109–110 Elementary Reading (with Mandarin pronunciation)
109, fall; 110, spring. 3 credits each term. Prerequisite: for Chinese 110, 109 or equivalent. Satisfactory completion of Chinese 110 fulfills the qualification portion of the language requirement.
P. Wang.
This course is intended primarily for students who speak some Chinese [i.e., at home], but who have had little or no formal training. The focus is on characters, reading comprehension, and reading aloud with standard pronunciation.

CHIN 111–112 Cantonese Elementary Speaking
111, fall; 112, spring. 3 credits each term. Prerequisites: for Chinese 111, permission of instructor; for Chinese 112, Chinese 111. Both Chinese 112 and 114 or equivalents are necessary to fulfill any language requirements.
A. Lau.
A course for beginners. Conversation in standard Cantonese as spoken in Hong Kong and Canton.

CHIN 113–114 Cantonese Elementary Readings
113, fall; 114, spring. 3 credits each term. Prerequisites: for Chinese 113, concurrent enrollment in 111, or permission of instructor; for Chinese 114, Chinese 113 and concurrent enrollment in 112. Both Chinese 112 and 114 or equivalents are necessary to fulfill any language requirements.
A. Lau.
Focus on characters [Cantonese as well as Mandarin], reading comprehension, and reading aloud with Cantonese pronunciation.

CHIN 201–202 Intermediate Mandarin @
201, fall or summer; 202, spring or summer. 4 credits each term. Prerequisites: for Chinese 201, Chinese 102 or equivalent; for Chinese 202, Chinese 201. Satisfactory completion of Chinese 201 fulfills the proficiency portion of the language requirement.
Staff.
Continuing instruction in written and spoken Chinese.

CHIN 211–212 Intermediate Cantonese @
211, fall; 212, spring. 4 credits each term. Prerequisites: for Chinese 211, Chinese 112 and 114 or equivalent; for Chinese 212, Chinese 211.
A. Lau.
Continuing instruction in spoken Cantonese and in characters [Cantonese and Mandarin], reading comprehension, and reading aloud with Cantonese pronunciation.

CHIN 301–302 Advanced Mandarin @
301, fall; 302, spring. 4 credits each term. Prerequisites: for Chinese 301, Chinese 202 or equivalent; for Chinese 302, Chinese 301.
P. Wang and staff.
Continuing instruction in spoken Chinese and in various genres and styles of written Chinese.

CHIN 303–304 Advanced Mandarin Conversation @
303, fall; 304, spring. 1 credit each term. Prerequisites: Chinese 201–202 or equivalent or permission from instructor. S-U grades only.
Staff.
Conversation and reading practice for students who wish to maintain language skills. Guided conversation and oral composition and translation. Corrective pronunciation drill.

CHIN 311–312 Advanced Cantonese @
311, fall; 312, spring. 4 credits each term. Prerequisites: for Chinese 311, Chinese 212 or equivalent; for Chinese 312, Chinese 311.
A. Lau.
Continuing instruction in spoken Cantonese and written Chinese with Cantonese pronunciation. Content will be determined in part by needs of students.

[CHIN 401 History of the Chinese Language
Fall or spring, according to demand. 4 credits. Prerequisite: permission of instructor.
Staff.
Survey of phonological and syntactic developments in Chinese.]

[CHIN 403 Linguistic Structure of Chinese I]

CHIN 404 Linguistic Structure of Chinese II
Spring. 4 credits. Prerequisite: permission of instructor.
Y. Li.
Syntax of modern Mandarin Chinese.

[CHIN 405 Chinese Dialects
Fall or spring, according to demand. 4 credits. Prerequisite: permission of instructor.
Staff.

Introductory survey of modern dialects and their distinguishing characteristics.]

CHIN 411–412 Readings in Modern Chinese (Mandarin pronunciation only)
411, fall; 412, spring. 4 credits each term. Prerequisites: for Chinese 411, Chinese 302 or equivalent; for Chinese 412, Chinese 411.
P. Wang.
Reading and discussion of various styles and genres of Chinese. Special attention to building vocabulary and increasing reading speed. Selections from current events, newscasts, and literature.

CHIN 413–414 Chinese Reading Tutorials
413, fall; 414, spring. 2 credits each term. Prerequisites: Chinese 302 or equivalent and permission of instructor.
J. Wheatley.
Specialized reading for students in Chinese studies. Content varies.

CHIN 415–416 Expository Writing in Modern Chinese
415, fall; 416, spring. 3 credits. Prerequisites: permission of instructor.
Staff.
Letter writing and other forms of composition for students with advanced reading and speaking ability in standard Chinese.

CHIN 607 Chinese Dialect Seminar
Fall or spring, according to demand. 4 credits. Prerequisites: Chinese 405 and permission of instructor.
Staff.
Analysis and field techniques in a selected dialect area.

FALCON (Full-year Asian Language Concentration)
J. Wheatley, 416 Morrill Hall (255–9301).

CHIN 160 Introductory Intensive Mandarin
Summer only. 10 credits.
J. Wheatley and staff.
Introduction to spoken and written Mandarin. Lectures on linguistic and cultural matters, intensive drills with native speakers, and laboratory work. Students who complete this course with a grade of B or above normally are eligible to enroll in an intermediate course.

CHIN 161–162 Intensive Mandarin @
161, fall; 162, spring. 16 credits each term. Prerequisites: for Chinese 161, Chinese 160 (Cornell summer intensive course) or permission of instructor; for Chinese 162, Chinese 161. Satisfactory completion of Chinese 161 fulfills the proficiency portion of the language requirement.
J. Wheatley and staff.

Danish

Fees. A small fee may be charged for photocopied texts for course work.

DANSH 131–132 Elementary Danish
131, fall; 132, spring. 3 credits each term. Prerequisite for Danish 132, Danish 131 or equivalent. This language series cannot be used to satisfy the language requirement.
P. M. Mitchell.

Dutch

Fees. A small fee may be charged for photocopied texts for course work.

DUTCH 121–122 Elementary Dutch
121, fall or summer; 122, spring or summer. 4 credits each term. Prerequisite: permission of instructor.
M. Briggs.
Intensive practice in listening, speaking, reading, and writing basic Dutch in meaningful contexts. The course also offers insight into Dutch language, culture, and society.

DUTCH 123 Continuing Dutch
Fall. 4 credits each term. Prerequisite: Dutch 122 or equivalent.
M. Briggs.
Improves speaking skills, such as fluency and pronunciation, focusing on verbal communication skills; offering a wide range of readings and sharpening listening skills based on Dutch and Dutch-speaking cultures.

DUTCH 203 Intermediate Composition and Conversation
Spring. 3 credits. Prerequisite: Qualification in Dutch or permission of instructor.
M. Briggs.
Improved control of Dutch grammatical structures and vocabulary through guided conversation, compositions and reading, drawing on Dutch and other Dutch-speaking cultures.

English

Intensive English Program, see p. 302.

Fees. A small fee may be charged for photocopied texts for course work.

ENGLF 205 English as a Second Language
Fall. 4 credits. Prerequisite: placement by examination.
M. Martin.
Advanced spoken and written English, with emphasis on speaking, understanding, and reading.

ENGLF 206 English as a Second Language
Spring. 3 credits. Prerequisite: English 205 or placement by examination.
M. Martin.
Designed for those who have completed English 205 and who require or desire further practice. Emphasis is on developing control of written as well as spoken language.

ENGLF 209 English as a Second Language
Fall or spring. 1 credit. Prerequisite: placement by examination.
M. Martin.
Practice in informal conversational English pronunciation, techniques for gaining information, informal conversation, and classroom speaking. Students also practice giving informal presentations. Personal conferences with the instructor supplement class work.

ENGLF 210 English as a Second Language
Spring. 1 credit. Prerequisite: placement by examination.
M. Martin.
Practice in academic speaking. Formal classroom discussion techniques and presentation of information in various forms. Personal conferences supplement class work.

ENGLF 211 English as a Second Language
Fall, spring, or summer. 3 credits. Prerequisite: placement by examination.
D. Campbell.
Academic writing with emphasis on improving organization grammar, vocabulary, and style through the writing and revision of short papers relevant to students' fields. Frequent individual conferences supplement class work.

ENGLF 212 English as a Second Language
Spring. 3 credits. Prerequisite: English 211 or placement by examination.
D. Campbell.
Research paper writing. Students work on one project, for example, a research paper on a topic of their choice (if for another course, permission of the other instructor is mandatory), a thesis proposal, pre-thesis, or part of a thesis such as the literature review. Course work involves practice in paraphrase, summary, the production of cohesive, coherent prose, vocabulary use, and grammatical structure. Frequent individual conferences supplement class work. Separate sections for Social Sciences/Humanities and for Science/Technology.

ENGLF 213 Written English for Non-Native Speakers
Spring. 3 credits. Prerequisite: placement by examination.
M. Martin.
Designed for those whose writing fluency is sufficient for them to carry on regular academic work but who feel the desire for refining and developing their ability to express themselves clearly and effectively. As much as possible, students receive individual attention.

Freshman Writing Seminar

ENGLB 215–216 English for Later Bilinguals
For description see freshman writing seminar brochure.

Ewe

See listings under Africana Studies and Research Center.

French

A. Cohn, L.R. Waugh (director of undergraduate studies, 315 Morrill Hall, 255–0717).

For literature and advanced language courses see Romance Studies.

The Major

The French major has two separate tracks, the literature track and the linguistics track. The linguistics track is described here; for the literature track, see the description under Romance Studies. The major in French linguistics, is designed to give students proficiency in the oral and written language and to develop skills in the linguistic analysis of French.

While prospective majors should try to plan their programs as far ahead as possible, no student will be refused admission merely because of a late start. It is even possible for a student to begin French and/or linguistics at Cornell and become a major. Students wishing to major in French linguistics should consult Professor Linda Waugh, who will advise them.

The French Linguistics Major

To be admitted to the major, students should have completed Linguistics 101 and French

203 or 205–213 (or their equivalents) by the end of the sophomore year. It is expected that all students in the major will also take either French 221 or 222, preferably by the end of the sophomore year.

To complete the major, a student must:

1) acquire a sound degree of competence in French. This competence is demonstrated by the successful completion of French 312 (or its equivalent) or by the passing of a special examination. Typically, students in the major will have taken 312 by the end of their junior year.
2) take six courses in French, Romance, and general linguistics (in addition to Linguistics 101). These courses will include at least one course concerning the history of French (e.g., French 401, Romance Linguistics 321, French 629 [listed under Romance Studies]), one course concerning the structure of French (e.g., French 408, 410, 604, Linguistics 323), and one other course in French linguistics.
3) take two courses (preferably a sequence) in some allied area, for example, (a) French literature and civilization, (b) psycholinguistics, (c) philosophy of language, (d) French history, culture, music, or history of art or architecture. (This requirement may be waived for students who are double majors in other fields).

Study Abroad in France

French majors or other interested students may study in France for one or two semesters during their junior year. Opting for one of several study-abroad plans recognized by the departments of Romance Studies and Modern Languages and Linguistics facilitates the transfer of credit. Information about these plans is available from Jacques Bëreaud, director of undergraduate studies, Department of Romance Studies. (See the description of the program in Paris sponsored by Cornell under the Department of Romance Studies.)

Honors. The honors program encourages well-qualified students majoring in French linguistics to do independent work in French outside the structure of courses. The preparation of the senior honors essay, generally spread over two terms, provides a unique learning opportunity, since it allows for wide reading, and extensive rewriting to a degree not practically possible in the case of course papers.

No special seminars or courses are required of honors students, but they will have regular meetings with the faculty advisers who have agreed to supervise their work. They may receive course credit by enrolling in French 429–430, but these independent study courses must be taken in addition to the courses that meet the minimum requirements for the major. At the end of the senior year each honors student is examined orally on the honors essay by a jury consisting of his or her faculty adviser and two other faculty members. The awarding of honors is determined by the student's grades in the major and the quality of the honors essay.

Fees. Depending on the course, a small fee may be charged for copies of texts for course work.

FRDML 101 Basic Course I
Summer only. 6 credits.
M. J. Davis.
An introductory course offering opportunities for student interaction and intensive practice in listening to, speaking, reading, and writing basic French in meaningful contexts. Students who have previously studied French must take the qualifying examination or receive permission from the instructor before registering for this course.

FRDML 121 Elementary French
Fall only. 4 credits. No prerequisites. Intended for beginning students or those placed by examination.
N. Gabriel.
The four recitation sections per week offer the opportunity for student interaction and intensive practice in listening to, speaking, reading, and writing basic French in meaningful contexts. Lectures offer insights into French language, culture, and society.

FRDML 122 Elementary French
Fall or spring. 4 credits. Prerequisite: French 121 or CPT score between 370 and 440. Students who obtain a CPT score of 560 after French 122 attain qualification and may enter the 200-level sequence; otherwise, French 123 is required for qualification.
Fall: M. J. Davis. Spring: N. Gabriel.
The goal of French 122 is to build on the students' elementary knowledge of French so that they can function in basic situations in a French-speaking culture. Sections continue to provide intensive, context-specific practice in speaking, listening, reading, and writing. Lectures address cultural and linguistic issues.

FRDML 123 Continuing French
Fall, spring, or summer. 4 credits. Fall enrollment strictly limited. Limited to students who have previously studied French and have a CPT score between 450 and 559. Satisfactory completion of French 123 fulfills the qualification portion of the language requirement.
A. Grandjean-Levy.
French 123 is an all-skills course designed to improve pronunciation, oral communication, and reading ability; to establish a groundwork for correct writing; and to provide a substantial grammar review. The approach in the course encourages the student to see a foreign language as something more than a bunch of skills to be memorized. The course features authentic texts, a functional grammar, and exchange students from France who visit the sections.

FRDML 200 Intermediate Reading and Composition
Fall or spring. 3 credits. Prerequisite: qualification in French (French 123 or CPT score 560–649). Satisfactory completion of French 200 fulfills the proficiency portion of the language requirement.
C. Sparfel.
A course based on contemporary reading material. Review and expansion of grammar and of vocabulary; strengthening of writing skills. Taught in French.

FRDML 203 Intermediate Composition and Conversation I
Fall, spring, or summer. 3 credits. Prerequisite: qualification in French (French 123 or CPT score 560–649).
I. Daly.
Improved control of French grammatical structure and vocabulary through guided conversation, composition, and reading. Lectures include grammar review, listening comprehension exercises, and videos on current topics. Taught in French.

FRDML 204 has been renumbered as FRDML 213.

FRDML 205 Intermediate French: le francais multicolore #
Spring. 3 credits. Prerequisite: qualification in French (French 123 or CPT score of 560–649). Satisfactory completion of French 205 fulfills the proficiency portion of the language requirement.
N. Gabriel.
Review and expansion of grammar and vocabulary and opportunities to strengthen active language skills within the context of the wider French-speaking worlds. Contemporary readings, video, and audio materials and people from francophone countries of Europe, Africa, and the Americas will provide bases for individual and group projects. Taught in French.

FRDML 213 Intermediate Composition and Conversation II
Fall, spring, or summer. 3 credits. Enrollment limited. Prerequisite: French 200, 203 or 205 or, permission of instructor, or placement by Cornell Advanced Standing Examination (CASE) offered by the Department of Modern Languages and Linguistics. This course, or its equivalent, is required for admission to the Cornell Abroad program.
C. Waldron.
Emphasis on improving oral and written expression of accurate, idiomatic French. Includes enrichment of vocabulary, readings in contemporary prose, treatment of specific problems in grammar, guest speakers, and presentations of videos and films. Taught in French.

[FRDML 401 History of the French Language #
Fall. 4 credits. Prerequisites: qualification in French and Linguistics 101, or permission of instructor. Offered alternate years. Not offered 1992–93.
Staff.
Diachronic development of French from Latin, with emphasis on phonological and morphological change. Course work includes problems in reconstruction, textual analyses, discussions of theoretical topics, and external history.]

[FRDML 407 Applied Linguistics: French
Fall. 4 credits. Prerequisite: qualification in French. Offered alternate years. Not offered 1992–93.
Staff.
Designed to equip the student with the ability to apply linguistic descriptions in teaching French, with special emphasis on phonetics and morphology.]

[FRDML 408 Linguistic Structure of French I (also Linguistics 408)
Spring. 4 credits. Prerequisites: qualification in French and Linguistics 101 or Linguistics 400, or permission of instructor. Offered alternate years. Not offered 1992–93.
A. Cohn.
A synchronic study and analysis of modern French, with emphasis on its phonology and morphology.]

FRDML 410 Linguistic Structure of French II
Fall. 4 credits. Prerequisite: permission of instructor. Offered alternate years.

L. Waugh.
A synchronic study and analysis of modern French, with emphasis on semantics, pragmatics, and discourse analysis.

FRDML 604 Contemporary Theories of French Grammar
Spring. 4 credits. Prerequisite: permission of instructor.
L. Waugh.
Selected readings of twentieth-century French linguistics.

FRDML 630 French for Reading—Graduate Students
Spring and summer. 3 credits. Limited to graduate students.
Staff.
The primary aim of this course is to develop skill in reading French. (Those interested in an all-skills approach should consider French 121–122.) Some flexibility in selecting texts according to field of interest is offered. One hour per week is devoted to vocabulary building and preparation for standardized tests.

FRDML 700 Seminar in French Linguistics
Fall or spring, according to demand. Credit to be arranged.
Staff.
Seminars are offered according to faculty interest and student demand. Topics in recent years have included current theories in French phonology, current theories in French syntax, and semantics of French.

German

J. H. Jasanoff, (director of undergraduate studies, 306 Morrill Hall, 255-0732), W. Harbert. For literature courses see German Studies.

The German Major

See German Studies.

Study Abroad

Cornell has a formal agreement with the University of Hamburg enabling its undergraduates to take courses in any field offered by the German university. The program offers a challenging course of study and the experience of total immersion in German life and culture. Participants in this program attend a required 3-credit orientation course in September, which is designed to help them adjust to the academic and social life of Germany. Special field trips are organized as part of the orientation session. Beginning in mid-October, students enroll as fully matriculated students at the University of Hamburg.

Cornell maintains a center in Hamburg with appropriate support staff. The resident director is a faculty member from Cornell, who teaches a special seminar each semester, provides academic advice, and helps ensure the quality of the courses. The center, which includes a classroom, a small library, and word-processing facilities, is used by students for the orientation session, special seminars, tutorials, lectures, and informal gatherings.

Applicants are expected to have attained at least proficiency in German prior to departure. Students are strongly encouraged to study abroad for the entire year rather than for one semester. For further information, students should contact J. Jasanoff, director of undergraduate studies, Department of Modern Languages and Linguistics (306 Morrill Hall, 255-0732), and the Cornell Abroad Office (474 Uris Hall, 255–6224).

German Area Studies Major

See German Studies.

Honors. The honors program in German is open to superior students who want to work independently in an area of their own choice. Students are free to select any faculty member of the Field of Germanic Studies (in the case of area studies majors, the appropriate member of their committee) to assist them in designing their honors program, to supervise their work, and to help them select a suitable topic for an honors essay. The independent study courses, German 451 and 452, may form part of the program.

Freshman Writing Seminar Requirement

See German Studies.

Fees. Depending on the course, a small fee may be charged for photocopied texts for course work.

GERLA 121–122 Elementary German
121, fall or summer; 122, spring or summer. 4 credits each term. Prerequisite for German 122: German 121 or equivalent. Intended for beginners or students placed by examination. Students who obtain a CPT score of 560 after German 121–122 attain qualification and may enter the 200–level sequence; otherwise German 123 is required for qualification. Evening prelims.
D. McGraw.
A thorough grounding in all the language skills is given: listening, speaking, reading, and writing. Language practice is in small groups. Lectures cover grammar, reading, and cultural information.

GERLA 123 Continuing German
Fall or spring. 4 credits. Limited to students who have previously studied German and have a CPT achievement score between 450 and 559. Satisfactory completion of German 123 fulfills the qualification portion of the language requirement.
D. Hobbs.
An all-skills course designed to prepare students for study at the 200 level.

GERLA 203 Intermediate Composition and Conversation
Fall or spring. 3 credits. Prerequisite: qualification in German (German 123 or CPT score of 560–649).
Staff.
Guided conversation, composition, reading, and grammar review emphasizing the development of accurate and idiomatic expression.

GERLA 204 Intermediate Composition and Conversation
Fall or spring. 3 credits. Prerequisite: German 203 or permission of instructor. Evening prelims.
G. Lischke.
Emphasis on improving oral and written expression of idiomatic German. Enrichment of vocabulary and appropriate use of language in conversational context. Material consists of readings in contemporary prose, articles on current events, a novel, treatment of specific grammar issues, and discussion of several videos.

GERLA 303–304 Advanced Composition and Conversation
303, fall; 304, spring. 4 credits each term. Prerequisite for German 303: German 204 or equivalent. Prerequisite for German 304: German 303 or equivalent.
G. Valk.
Emphasis is on increasing the student's oral and written command of German. Study of present-day syntax and different levels of style. Discussions of current events and literary texts.

GERLA 306 Zeitungsdeutsch
Fall. 4 credits. Prerequisite: German 304 or equivalent.
G. Lischke.
Readings and analyzing of various German daily and weekly newspapers with special emphasis on differences in journalistic styles.

[GERLA 401 Introduction to Germanic Linguistics
Fall. 4 credits. Prerequisite: Linguistics 101 or permission of instructor. Not offered 1992–93.
W.E. Harbert.
Survey of major issues in historical Germanic linguistics.]

[GERLA 402 History of the German Language #
Spring. 4 credits. Prerequisites: German 204 and Linguistics 101 or permission of instructor. Offered alternate years. Not offered 1992–93.
Staff.
Phonological, morphological, syntactic, and semantic developments from pre-Old High German times to the present.]

[GERLA 403 Modern German Phonology
Fall. 4 credits. Prerequisites: German 304 or equivalent, and Linguistics 101 or 301. Not offered 1992–93.
Staff.
The phonological system of German is viewed from various theoretical approaches.]

[GERLA 404 Modern German Syntax
Spring. 4 credits. Prerequisite: German 304 or equivalent, and Linguistics 101 or 303. Not offered 1992–93.
W. E. Harbert.
An application of selected theoretical syntactic models to problems in the syntax of modern German.]

[GERLA 406 Runology #
Spring. 4 credits. Prerequisite: German 401. Not offered 1992–93.
W. E. Harbert.
A study of the inscriptions in the older futhark and their relevance to historical Germanic linguistics.]

GERLA 407 Teaching German as a Foreign Language
Fall or spring. 2 credits.
Staff.
This course has been designed to familiarize students with current ways of thinking in the field of applied linguistics and language pedagogy. It introduces different concepts of foreign language methodology as well as presents and discusses various techniques as they can be implemented in the foreign language classroom. Special consideration is given topics such as planning syllabi, writing classroom tests, and evaluating student's performance.

[GERLA 602 Gothic
Spring. 4 credits. Prerequisite: Linguistics 101. Offered alternate years. Not offered 1992–93.
W. E. Harbert.
Linguistic structure of Gothic, with extensive readings of Gothic texts.]

[GERLA 603 Old High German, Old Saxon
Fall. 4 credits. Prerequisite: Linguistics 101. Offered alternate years. Not offered 1992–93.
W. E. Harbert.

[GERLA 605 Structure of Old English
Fall. 4 credits. Prerequisite: German 401. Offered alternate years. Not offered 1992–93.
W. E. Harbert.
Linguistic overview of Old English, with emphasis on phonology and syntax.]

[GERLA 606 Topics in Historical Germanic Phonology
Fall. 4 credits. Prerequisite: German 401. Not offered 1992–93.
Staff.
The development of the sound system from Proto-Germanic to its daughter languages.]

[GERLA 607 Topics in Historical Germanic Morphology
Fall. 4 credits. Prerequisite: German 401. Not offered 1992–93.
J. Jasanoff.
The Germanic verbal system and its Indo-European origins.]

[GERLA 608 Topics in Historical Germanic Syntax
Fall. 4 credits. Prerequisite: German 401. Not offered 1992–93.
W. E. Harbert.
A diachronic and comparative investigation of syntactic processes in the older Germanic languages.]

GERLA 609–610 Old Norse
609, fall; 610, spring. 4 credits each term.
Staff.
Study of the linguistic structure of Old Norse, with extensive reading of Old Norse texts.

GERLA 611 Readings in Old High German and Old Saxon
Spring. 4 credits.
J. Jasanoff.
Texts are chosen to suit the interests of the students taking the course but normally include selections from the more extensive Old High German and Old Saxon sources (Otfrid, Tatian, Heliand) as well as representative shorter works such as Hildebrandslied, Muspilli, and Genesis.

GERLA 631–632 Elementary Reading I, II
631, fall or summer; 632, spring or summer. 3 credits each term. Limited to graduate students. Prerequisite for German 632: German 631 or equivalent.
D. Hobbs.
Emphasis is on developing skill in reading, although some attention will be devoted to the spoken language, especially to listening comprehension.

[GERLA 710 Seminar in Germanic Linguistics
Fall or spring, subject to the needs of students and to the limitations of staff time. 4 credits. Not offered 1992–93.
Staff.]

[GERLA 720 Seminar in Comparative Germanic Linguistics
Fall or spring, subject to the needs of students and to the limitations of staff time. 4 credits. Not offered 1992–93.
Staff.
Topics include phonology, morphology, syntax, and dialectology of the older Germanic languages.]

[GERLA 730 Seminar in German Linguistics
Fall or spring, subject to the needs of students and the limitations of staff time. 4 credits. Not offered 1992–93.
Staff.
Selected topics including the history, structure, and dialects of German.]

Modern Greek

See listings under Classics.

Modern Hebrew

See listings under Near Eastern Studies.

Hindi-Urdu

Fees. A small fee may be charged for photocopied texts for course work.

HINDI 101–102 Elementary Hindi-Urdu
101, fall; 102, spring. 6 credits each term. Prerequisite for Hindi 102: Hindi 101 or equivalent.
C. Fairbanks.
A semi-intensive course for students without prior experience in Hindi or a closely related Indian language. A thorough grounding is given in all language skills: listening, speaking, reading, and writing. Students who have had exposure to Hindi or a closely related language in the home or otherwise should generally take 109–110. Check with instructor regarding placement.

HINDI 109–110 Accelerated Elementary Hindi-Urdu
109, fall; 110, spring. 3 credits each term. Prerequisite for Hindi 110: Hindi 109 or equivalent.
C. Fairbanks.
An entry-level sequence for students with some prior exposure to Hindi or a closely related Indian language. This course sequence will provide a thorough grounding in all the language skills: listening, speaking, reading, and writing. Completion of this sequence, including satisfactory performance on an examination given at the end of 110, will constitute a level of performance equal to that of the 101–102 sequence, and will thus be considered to fulfill qualification for the language requirement plus eligibility for 200-level Hindi courses. Check with instructor regarding placement.

[HINDI 201–202 Intermediate Hindi Reading @
201, fall; 202, spring. 3 credits each term. Prerequisites: for Hindi 201, Hindi 102; for Hindi 202, Hindi 201 or permission of instructor.
C. Fairbanks.]

HINDI 203–204 Intermediate Composition and Conversation @
203, fall; 204, spring. 3 credits each term. Prerequisites: for Hindi 203, Hindi 102; for Hindi 204, Hindi 203 or permission of instructor.
C. Fairbanks.

[HINDI 301–302 Advanced Readings in Hindi Literature @
301, fall; 302, spring. 4 credits each term. Prerequisites: for Hindi 301, Hindi 202; for Hindi 302, Hindi 301 or equivalent. Not offered 1992–93.
C. Fairbanks.]

HINDI 303–304 Advanced Composition and Conversation @
303, fall; 304, spring. 4 credits each term. Prerequisites: for Hindi 303, Hindi 204 or equivalent; for Hindi 304, Hindi 303 or equivalent.
C. Fairbanks.

[HINDI 305–306 Advanced Hindi Readings @
305, fall; 306, spring. 4 credits each term. Prerequisites: for Hindi 305, Hindi 202 or equivalent; for Hindi 306, Hindi 305 or equivalent. Not offered 1992–93.
C. Fairbanks.
Intended for those who wish to do readings in history, government, economics, etc., instead of literature.]

Note: For complete descriptions of courses numbered 600 and above, consult the appropriate instructor.

[HINDI 700 Seminar in Hindi Linguistics
Fall or spring. 3 credits. Prerequisite: permission of instructor. Not offered 1992–93.
Staff.]

Hungarian

Fees. A small fee may be charged for photocopied texts for course work.

[HUNGR 131–132 Elementary Hungarian
131, fall; 132, spring. 3 credits each term. This language series cannot be used to satisfy the language requirement. Not offered 1992–93.
Staff.
Intended for beginners or students with limited knowledge of the language.]

Indonesian

For students who have completed Indonesian 121–122–123 or its equivalent there is the option of a one-semester program in Malang, East Java, during the junior year. The program combines a variety of cultural and artistic options with area course work and advanced language study. Complete information is available through Cornell Abroad.

Students who have completed a minimum of 18 credits or the equivalent are eligible to apply for a summer program in the Advanced Indonesian Abroad Program. Further information is available from Professor John Wolff.

Fees. A small fee may be charged for photocopied texts for course work.

INDO 121–122 Elementary Indonesian
121, fall; 122, spring. 4 credits each term. Prerequisite for Indonesian 122: Indonesian 121.
J. U. Wolff.
A thorough grounding is given in basic speaking and listening skills with an introduction to reading.

INDO 123 Continuing Indonesian
Fall. 4 credits. Prerequisites: Indonesian 122 or equivalent. Satisfactory completion of Indo 123 fulfills the qualification portion of the language requirement.
J. U. Wolff.
Improves speaking skills, such as fluency and pronunciation, focusing on verbal communication skills; offers a wide range of readings and sharpens listening skills.

INDO 205–206 Intermediate Indonesian @
205, fall; 206, spring. 3 credits each term. Prerequisite for 205: Indonesian 123 or equivalent; Indonesian 206: Indonesian 205 or equivalent. Satisfactory completion of Indo 205 fulfills the proficiency portion of the language requirement.
J. U. Wolff.
This course develops all four skills: reading, writing, speaking, and comprehension.

[INDO 300 Linguistic Structure of Indonesian
Fall or spring. 4 credits. Prerequisites: Indonesian 123 or equivalent and Linguistics 101. Not offered 1992–93.
Hours to be arranged. J. U. Wolff.]

[INDO 301–302 Advanced Readings in Indonesian and Malay
301, fall; 302, spring. 4 credits each term. Prerequisites: for Indonesian 301, Indonesian 205–206 or equivalent; for Indonesian 302, Indonesian 301. Not offered 1992–93.
J. U. Wolff.]

INDO 303–304 Advanced Indonesian Conversation and Composition
303, fall; 304, spring. 4 credits each term. Prerequisites: for Indonesian 303, Indonesian 206; for Indonesian 304, Indonesian 303 or equivalent.
J. U. Wolff.

INDO 305–306 Directed Individual Study
305, fall; 306, spring. 2–4 credits. Prerequisite: Indonesian 301–302 and 303–304 or equivalent knowledge of Indonesian or Malay.
J. U. Wolff.
A practical language course on an advanced level in which the students will read materials in their own field of interest, write reports, and meet with the instructor for two hours a week for two credits and twice a week for four credits.

[INDO 401–402 Advanced Readings in Indonesian and Malay Literature
401, fall; 402, spring. 4 credits each term. Prerequisites: for Indonesian 401, Indonesian 302 or equivalent; for Indonesian 402, Indonesian 401 or equivalent. Not offered 1992–93.
J. U. Wolff.]

FALCON (Full-year Asian Language Concentration)

INDO 161–162 Intensive Indonesian
161, fall; 162, spring. 16 credits each term. Prerequisite: permission of instructor.
J. U. Wolff and staff.

Related Course
Seminar in Austronesian Linguistics (Linguistics 655–656).

Italian
G. Chierchia, C. Rosen.

For literature courses see Romance Studies.

The Italian Major
See Romance Studies.

Study Abroad
Italian majors may study in Italy, generally during their junior year, under any of those study-abroad plans organized by American universities that allow the transfer of grades and credit, such as the Cornell program in Rome.

The College of Architecture, Art, and Planning maintains a program open to all qualified students attending Cornell. The program is housed in the sixteenth-century Palazzo Massimo, designed by the architect Baldassare Peruzzi, on the Corso Vittorio Emanuele, in the heart of Rome. Students may enroll for a semester in the fall or spring. Courses regularly taught at the Palazzo Massimo include: Architecture 300, 401, 402, 500, 502, Design Studio; Architecture 338 and 399, Special Topics in Architectural History; Architecture 458, Special Projects in Design Communications; Architecture 367, Contemporary Italian Culture; Architecture 510, Thesis Introduction; Art 251, 311, 322, and 371; and History of Art 371, Renaissance and Baroque Art in Rome; Italian 111, 112, elementary Italian 111 and 112 correspond to Cornell courses 121 and 122 respectively (see below). Students having passed 111 in Rome will be admitted to 122 when they get back to Cornell. Students having passed 112 in Rome will be granted credit but must take the Italian Skills Assessment for satisfaction of the language requirement and for placement into more advanced courses upon their return to Cornell. More advanced Italian classes in Rome are also being organized.

To be eligible, students must have completed the first two years of their curriculum requirements and be in good academic standing.

Fees. Depending on the course, a small fee may be charged for copies of texts for course work.

ITALA 101 Basic Course I
Summer only. 6 credits.
Staff.
A thorough grounding in all basic language skills. Students who have previously studied Italian must take the qualifying examination before registering for this course.

ITALA 121–122 Elementary Italian
121, fall; 122, spring. 4 credits each term. Prerequisite for Italian 122: Italian 121 or equivalent. Intended for beginners or students placed by examination. At the end of Italian 122, students who score 560 or higher on the Italian Skills Assessment attain qualification and may enter the 200-level sequence; otherwise Italian 123 is required for qualification.
M. Swenson.
A thorough grounding is given in all the language skills: listening, speaking, reading, and writing. Language practice is in small groups. Lectures cover grammar and cultural information.

ITALA 123 Continuing Italian
Fall. 4 credits. Limited to students who have previously studied Italian and score between 450 and 559 on the Italian Skills Assessment. Satisfactory completion of Italian 123 fulfills the qualification portion of the language requirement.
J. Scarpella.
Italian 123 is an all-skills course designed to improve pronunciation, oral communication, and reading ability; to establish a groundwork for correct writing; and to provide a substantial grammar review.

ITALA 203–204 Intermediate Composition and Conversation @
203, fall or spring; 204, fall or spring. 3 credits each term. Prerequisites: for Italian 203, qualification in Italian; for Italian 204, 203 or equivalent.
203, fall: I. Chierchia. 203, spring: J. Scarpella. 204, fall or spring: S. Stewart.
Guided conversation, composition, reading, pronunciation, and grammar review emphasizing the development of accurate and idiomatic expression in the language.

Note: Students placed in 200-level courses also have the option of taking courses in introductory literature; see separate listing under Italian 201 for description of this course, which may be taken concurrently with the Italian 203–204 language courses described above. The introductory literature courses are offered by the respective literature departments, and the 203–204 language courses by the Department of Modern Languages and Linguistics.

ITALA 300 Advanced Italian: Language in Italian Culture
Spring. 3 credits. Prerequisite: Italian 204 or equivalent or permission of instructor.
Staff.
Further development of all skills, with emphasis on self-expression. Readings center on two themes: (1) contemporary Italian life and (2) the Italian language, its origins, development, and present state, including the role of the dialects. Emphasis on vocabulary building and awareness of stylistic levels.

[ITALA 403 Linguistic Structure of Italian
Fall. 4 credits. Prerequisites: Linguistics 101 or equivalent, and qualification in any Romance language. Offered alternate years. Next offered fall 1993.
C. Rosen.
Survey of Italian grammar in the light of current linguistic theories. Central topics in syntax (auxiliaries, modals, clitics, agreement, impersonal constructions, causatives) and in phonology (syllable format, stress, raddoppiamento phenomena).]

ITALA 404 History of the Italian Language
Spring. 4 credits. Prerequisites: Linguistics 321 and either Italian 201 or 203 or equivalent.
C. Rosen.
Overview of the Italian dialects from the earliest texts to the present day. Emergence of the standard language. External history and sociolinguistic circumstances.

[ITALA 631 Readings in Italian Opera Libretti
Spring. 2 credits. For graduate students only. Prerequisite: permission of instructor. Offered alternate years. Next offered spring 1994.
C. Rosen.

Several libretti are read with the aim of understanding the syntax, literal meaning, and immediate metaphorical meanings. Some discussion of metrics. Intended primarily for grads concurrently enrolled in a music seminar, with which the readings are correlated.]

Japanese

For literature courses see Asian Studies.

Fees. A small fee may be charged for photocopied texts for course work.

JAPAN 101–102 Elementary Japanese
101, fall; 102, spring. 6 credits each term. Prerequisite for Japanese 102: Japanese 101 or placement by the instructor during registration. Intended for beginners or for those who have been placed in the course by examination.
Y. Nakanishi.
A thorough grounding is given in all the language skills: listening, speaking, reading, and writing.

JAPAN 201–202 Intermediate Japanese Reading I @
201, fall; 202, spring. 2 or 3 credits each term. Students currently taking Japanese 203 and 204 register for 2 credits and attend the W drill and the F lecture; other students register for 3 credits (with permission of instructor) and attend the W drill and the M, W, F lectures. Prerequisites: for Japanese 201, Japanese 102 or placement by the instructor during registration; for Japanese 202, Japanese 201 and 204 or placement by the instructor during registration.
Staff.
Reading of elementary texts with emphasis on practical materials, with development of writing skills.

JAPAN 203–204 Intermediate Japanese Conversation @
203, fall and summer; 204, spring and summer. 4 credits each term. Prerequisites: for Japanese 203, Japanese 102 or placement by the instructor during registration; for Japanese 204, Japanese 203, 205, or 223, or placement by the instructor during registration.
Staff.
Training in listening and speaking for students who have acquired basic oral proficiency. Students are strongly encouraged to enroll in Japanese 201–202 concurrently.

JAPAN 301–302 Intermediate Japanese Reading II @
301, fall; 302, spring. 4 credits each term. Prerequisites: for Japanese 301, Japanese 202 or placement by the instructor during registration; for Japanese 302, Japanese 301 or placement by the instructor during registration.
K. Selden and staff.
Reading of selected modern texts with emphasis on expository style.

JAPAN 303–304 Communicative Competence @
303, fall; 304, spring. 3 credits each term. Prerequisites: for Japanese 303, Japanese 204 or placement by the instructor during registration; for Japanese 304, Japanese 303 or placement by the instructor during registration.
Y. Katagiri.
Drill in the use of spoken Japanese within the constraints set by Japanese social settings.

JAPAN 341–342 Advanced Japanese for Business Purposes @
341, fall; 342, spring. 4 credits each term. Prerequisite: permission of instructor.
R. Sukle.
This course sequence will offer advanced training in Japanese with concentration on topics relating to the conduct of business. The emphasis will be on spoken skills, with provision for an optional reading component.

JAPAN 401–402 Advanced Japanese Reading @
401, fall; 402, spring. 4 credits each term. Prerequisites: for Japanese 401, Japanese 302 or placement by the instructor during registration; for Japanese 402, Japanese 401 or placement by the instructor during registration.
K. Selden and staff.
Reading of selected modern texts with emphasis on expository style.

JAPAN 404 Linguistic Structure of Japanese
Fall. 4 credits. Prerequisites: Japanese 102 or permission of instructor, and Linguistics 101, or equivalent introductory course in linguistics.
J. Whitman.
Introduction to the linguistic study of Japanese, with an emphasis on morphology and syntax.

JAPAN 407–408 Oral Narration and Public Speaking
407, fall; 408, spring. 2 credits each term. Prerequisites: for Japanese 407, Japanese 304 or placement by the instructor during registration; for Japanese 408, Japanese 407 or placement by the instructor during registration.
K. Selden.
Instruction in storytelling, lecturing, and speechmaking, with emphasis on both the construction of discourse and Japanese patterns of oral delivery.

JAPAN 410 History of the Japanese Language @#
Fall. 4 credits. Prerequisite: permission of instructor.
J. Whitman.
An overview of the history of the Japanese language followed by intensive examination of issues of interest to the participants. Students should have a reading knowledge of Japanese.

JAPAN 421–422 Directed Readings
421, fall; 422, spring. Credit to be arranged. Limited to advanced students and offered according to staff-time availability. Prerequisite: placement by the instructor during registration.
K. Selden.
Topics are selected on the basis of student needs.

JAPAN 543–544 Intermediate Japanese for Business Purposes
543, fall; 544, spring. 4 credits. For graduate students only.
R. Sukle.
Training in listening and speaking for students who have acquired basic oral proficiency. For students in international business and economics.

JAPAN 545–546 Advanced Japanese for Business Purposes
For graduate students only; undergraduates register for Japanese 341–342.
R. Sukle.
This course sequence will offer advanced training in Japanese with concentration on topics relating to the conduct of business. The emphasis will be on spoken skills, with provision for an optional reading component.

FALCON (Full-year Asian Language Concentration)

R. Sukle, 412 Morrill Hall (255–0734)

JAPAN 160 Introductory Intensive Japanese
Summer only. 10 credits.
R. Sukle and staff.
Introduction to spoken and written Japanese, including extensive drill with native speakers of the language, laboratory work, and lectures by the linguistics faculty on linguistic analysis and language and culture.

JAPAN 161–162 Intensive Japanese (FALCON) @
161, fall; 162, spring. 16 credits each term. Prerequisites: for Japanese 161, Japanese 102 or 160 (Cornell summer intensive course) at Cornell, or placement by the instructor during registration; for Japanese 162, Japanese 161 at Cornell or placement by the instructor during registration.
R. Sukle and staff.
Formal application to the program and acceptance is required for admission.

Javanese

Fees. A small fee may be charged for photocopied texts for course work.

JAVA 131–132 Elementary Javanese
131, fall; 132, spring. 3 credits each term. Prerequisite: for Javanese 132, Javanese 131 or equivalent.
J. U. Wolff and staff.
An elementary language course for those who have had no previous experience in the language.

JAVA 133–134 Continuing Javanese
133, fall; 134, spring. 3 credits each term. Prerequisites: for Javanese 133, Javanese 132 or equivalent; for Javanese 134, Javanese 133 or equivalent.
J. U. Wolff and staff.

JAVA 203–204 Directed Individual Study
203, fall; 204, spring. 3 credits. Prerequisite: Javanese 134 or equivalent.
J. U. Wolff and staff.
This is a practical language course on an intermediate level in which the students will work through readings and conversations under the guidance of a native speaker for three contact hours a week.

Old Javanese

See Linguistics 651–652.

Khmer (Cambodian)

Fees. A small fee may be charged for photocopied texts for course work.

KHMER 101–102 Elementary Khmer
101, fall; 102, spring. 6 credits each term. Prerequisite for Khmer 102: Khmer 101 or equivalent.
G. Diffloth and staff.

KHMER 201–202 Intermediate Khmer Reading @
201, fall; 202, spring. 3 credits each term. Prerequisites: for Khmer 201, Khmer 102; for Khmer 202, Khmer 201.
G. Diffloth and staff.

KHMER 203–204 Intermediate Composition and Conversation @
203, fall; 204, spring. 3 credits each term. Prerequisites: for Khmer 203, Khmer 102; for Khmer 204, Khmer 203.
G. Diffloth and staff.

KHMER 301–302 Advanced Khmer @
301, fall; 302, spring. 4 credits each term. Prerequisites: for Khmer 301, Khmer 202 or equivalent; for Khmer 302, Khmer 301.
G. Diffloth and staff.

KHMER 401–402 Directed Individual Study
401, fall; 402, spring. For advanced students. 4 credits each term. Prerequisite: permission of instructor.
G. Diffloth.

KHMER 403–404 Structure of Khmer
403, fall; 404 spring. 4 credits each term. Prerequisite: Linguistics 101 or equivalent.
G. Diffloth.

Korean

Fees. A small fee may be charged for photocopied texts for course work.

KOREA 101–102 Elementary Korean
101, fall; 102, spring. 4 credits each term.
H. Diffloth.
Covers basics of speaking, reading, and writing. Introduces Hangul writing system and rudiments of grammar.

KOREA 109–110 Elementary Reading
109, fall; 110, spring. 3 credits each term. Prerequisite: permission of instructor.
Satisfactory completion of Korean 110 will fulfill the qualification portion of the language requirement.
H. Diffloth.
This course is for students who have spoken some Korean in the home, but whose reading and writing skills are limited or nonexistent. If in doubt about eligibility, see instructor.

KOREA 201–202 Intermediate Korean @
201, fall; 202, spring. 4 credits each term.
H. Diffloth and staff.
Covers the basics of speaking, reading, and writing at the intermediate level. Introduces some reading and writing with Chinese characters.

Languages

Fees. A small fee may be charged for photocopied texts for course work.

LANG 300 Independent Language Study
Fall or spring. 1–4 credits. Prerequisite: permission of instructor.
Staff.
Languages are sometimes taught on a specialized basis when faculty are available to address particular student needs. Sections will be arranged with the instructor.

Latin

See listings under Classics.

Linguistics

Linguistics, the systematic study of human speech, lies at the crossroads of the humanities and the social sciences, and much of its appeal derives from the special combination of intuition and rigor that the analysis of language demands. The interests of the members of the Department of Modern Languages and Linguistics span most of the major subfields of linguistics, phonetics and phonology, the study of speech sounds; syntax, the study of sentence structure; semantics, the study of meaning; historical linguistics, the study of language change in time; sociolinguistics, the study of language as a social and cultural artifact; and applied linguistics, which relates the results of linguistic research to problems of bilingual education, second-language learning, and similar practical concerns.

Studying linguistics is not a matter of studying many languages. Linguistics is a theoretical discipline with ties to such areas as cognitive psychology, philosophy, logic, computer science, and anthropology. Nonetheless, knowing particular languages (e.g., Spanish or Japanese) in some depth can enhance understanding of the general properties of human language. Not surprisingly, then, many students of linguistics owe their initial interest to a period of exposure to a foreign language, and those who come to linguistics by some other route find their knowledge about languages enriched and are often stimulated to embark on further foreign language study.

Students interested in learning more about linguistics and its relationship to other disciplines in the humanities and social sciences are encouraged to take Linguistics 101, which is a prerequisite for most other courses in the field. The Cornell Linguistic Circle, a student organization, sponsors frequent colloquia on linguistic topics; these meetings are open to the university public, and anyone wishing to learn more about linguistics is most welcome to attend.

The Major

The prerequisite for a major in linguistics is the completion of Linguistics 101 and either Linguistics 201 or 203. The major has its own language requirement, which should be completed as early as possible: qualification in two languages other than English, one of which must be either non-European or non-Indo-European. With approval of the department's director of undergraduate studies, this requirement may be waived (i.e., reduced to the normal arts college language requirement) for students taking the cognitive studies concentration or a double major.

The other requirements for the linguistics major are as follows:

1) Linguistics 201 (Introduction to phonetics and phonology) or Linguistics 203 (Introduction to syntax and semantics), whichever one was not taken as a prerequisite to the major
2) Linguistics 410 (Historical)
3) Three of the following five courses, one of which must be either Phonology I or Syntax I:

   Linguistics 301 (Phonology I)

   Linguistics 303 (Syntax I)

   Linguistics 309 or 310 (Morphology I or II)

   Linguistics 319 (Phonetics I)

   Linguistics 421 (Semantics I)
4) A course at or beyond the 300 level in the structure of English or some other language, or a typological or comparative structure course such as Linguistics 401, or Field Methods.
5) One additional linguistics course for at least 4 credit hours, which may be a course with significant linguistic content in a related field.

Honors. Applications for honors should be made during the junior year. Candidates for admission must have a 3.0 (B) average overall and should have a 3.2 average in linguistics courses. In addition to the regular requirements of the major, the candidate for honors will complete an honors thesis and take a final oral examination in defense of it. The thesis is usually written during the senior year but may be begun in the second term of the junior year when the student's program so warrants. The oral examination will be conducted by the honors committee, consisting of the thesis adviser and at least one other faculty member in linguistics. Members of other departments may serve as additional members if the topic makes this advisable. Linguistics 493 and 494 may be taken in conjunction with thesis research and writing but are not required.

Distribution Requirement

The distribution requirement in the social sciences may be satisfied by taking Linguistics 101 and (1) any other course in linguistics or (2) any other course offered by the Department of Modern Languages and Linguistics for which this introductory linguistics course is a prerequisite.

Note: See also courses on the structure and history of particular languages or language families listed at the end of this section.

Fees: Depending on the course, a small fee may be charged for photocopied texts for course work.

LING 101 Theory and Practice of Linguistics
101, fall, spring, or summer. 4 credits each term
Fall: Y. Li; spring: J. Sereno.
An introductory course designed to provide an overview of the science of language, especially its theoretical underpinnings, methodology, and major findings. Linguistics 101 plus any other course in linguistics or any DMLL course for which Linguistics 101 is a prerequisite satisfies the social science distribution requirement.

LING 201 Introduction to Phonetics and Phonology
Spring. 4 credits. Prerequisite: Linguistics 101 or equivalent or permission of instructor.
A. Cohn.
An introduction to the study of human speech sounds and how they pattern in languages. The first part of the course will focus on phonetics: the production, acoustics, and perception of speech, with attention to both the common and the less common sounds of the world's languages. The second part of the course will focus on phonology: how human speech sounds pattern within and across

languages, with an emphasis on the rules that govern these patterns and their possible representation.

LING 203 Introduction to Syntax and Semantics
Fall. 4 credits. Prerequisite: Linguistics 101 or equivalent or permission of instructor.
S. McConnell-Ginet, J. Whitman.
This course focuses on language as a system of knowledge that enables native speakers to create and interpret the structures of their language. Part of the course will consider issues of syntactic structure, such as the order of constituents, the hierarchical organization of grammars, and syntactic universals. The other part of the course will focus on meaning and interpretation, addressing such issues as the role of context, how information is structured, and how is it encoded in the syntax.

[LING 244 Language Use and Gender Relations (also Women's Studies 244)
Spring. 4 credits. For non-majors or majors. Not offered 1992–93.
S. McConnell-Ginet.
This course explores connections between language (use) and gender/sex systems, addressing such questions as the following. How do sex and gender affect the ways we speak, the ways we interpret and evaluate speech? How do sociocultural differences in women's and men's roles affect their language use, their relation to language change? What is meant by sexist language? How does conversation structure the social worlds of women and men? Readings draw from work in linguistics, anthropology, philosophy, psychology, literature, and general women's studies and feminist theory.]

[LING 264 Language, Mind, and Brain
Fall. 4 credits. For non-majors or majors. Prerequisite: a basic course in linguistics and/or psychology is desirable. Not offered 1992–93.
J. S. Bowers.
An introductory course that emphasizes the formal structure of natural language and its biological basis. The following topics are covered: the formal representation of linguistic knowledge, principles and parameters of universal grammar, the basic biology of language, mechanisms of linguistic performance, the modularity hypothesis, and language and cognition. This course is especially suited for majors in fields such as psychology, philosophy, computer science, and linguistics (and also for those enrolled in the concentration in cognitive studies) who want to take a one-semester introduction to linguistics that concentrates on the formal principles that govern linguistic knowledge, along with some discussion of their biological realization and their use in perception and production.]

[LING 300 Multilingual Societies and Cultural Policy @
Fall. 4 credits. Not offered 1992–93.
Staff.
An interdisciplinary analysis of the impact of bilingualism on society, particularly in education and communication arts. The FLEX model is used to suggest a method of evaluating policy and program alternatives.]

LING 301–302 Phonology I, II
301, fall; 302, spring. 4 credits each term. Prerequisites: for Linguistics 301, Linguistics 201 or equivalent; for Linguistics 302, Linguistics 301 or permission of instructor.
D. Zec.
Basic topics in contemporary phonological theory, which studies the representational structures and principles underlying the human ability to produce and understand spoken language. 301: Adopting a cross-linguistic perspective, develops a conception of phonological representations in which different types of phonological information are arrayed on distinct structural planes. Includes the study of segmental features and their organization, the supra-segmental quantity, and syllable organization. Relations of phonology with morphology, syntax, and phonetics. 302: Using American English as a case study, explores phonological rules and their systematic relations. Principles of syllabification and metrical structure. The organization of the rule system, constraints on rule interaction, lexical and morphological conditioning of rules, stratal and prosadic organization. Evidence for the mental representation of speech; principles of phonological acquisition.

LING 303–304 Syntax I, II
303, fall; 304, spring. 4 credits each term. Prerequisites: for Linguistics 303, Linguistics 203; for Linguistics 304, Linguistics 303 or permission of instructor.
Fall: M. Diesing; spring: staff.
303 is an introduction to syntactic theory, with emphasis on the classical theory of transformational grammar. 304 is an advanced course, surveying current syntactic models and dealing with such issues as the nature of syntactic representation, levels of representation, principles of universal grammar, and the relation of syntax and semantics.

[LING 306 Functional Syntax
Fall. 4 credits. Prerequisite: Linguistics 101 or permission of instructor. Not offered 1992–93.
Staff.
A general survey of syntactic theories that highlight grammatical function and reveal its role in discourse structure.]

LING 309–310 Morphology I, II
309, fall; 310, spring. 4 credits each term. Prerequisite: for Linguistics 309; Linguistics 101 or equivalent or permission of instructor; for Linguistics 310: Linguistics 203 or permission of instructor.
Fall: L. Waugh; spring: staff.
309 is a general survey focusing on the relationship of meaning and form in morphology and introducing techniques of morphological analysis. Current research on form-meaning questions is discussed. 310 considers recent discussions in morphological theory, in particular the relationship of morphology and syntax.

[LING 311–312 The Structure of English
311, fall; 312, spring. 4 credits each term. Prerequisites: for Linguistics 311, Linguistics 101 or permission of instructor; for Linguistics 312, Linguistics 311 or permission of instructor. Not offered 1992–93.
S. McConnell-Ginet.
311 provides an overview of the syntactic structure of English, drawing upon relevant theoretical approaches. 312 deals with phonology, morphology, and special problems of English structure and semantics.]

[LING 316 Introduction to Mathematical Linguistics
Spring. 4 credits. Prerequisite: Linguistics 101 or equivalent. Offered alternate years. Not offered 1992–93.
F. Landman.
The course is an introduction to the mathematical concepts and techniques most frequently used in theoretical linguistics. Topics will include the following: elementary set theory, elementary logic, formal systems and algorithms, and trees, automata, and formal grammars. The course is designed for students who are interested in formal linguistics but feel they have a weak mathematical background. It presupposes no previous knowledge of formal methods and it will try to overcome any "anxiety" that such methods may give rise to.]

LING 319 Phonetics I
Fall. 4 credits. Prerequisite: Linguistics 201 or permission of instructor.
A. Jongman.
Provides a basic introduction to the study of phonetics. Topics to be covered include anatomy and physiology of the speech production apparatus, transcription and production of some of the world's sounds, basic acoustics, computerized methods of speech analysis, acoustic characteristics of sounds, speech perception, speech synthesis, stress and intonation.

LING 320 Phonetics II
Spring. 4 credits. Prerequisite: Linguistics 319.
A. Jongman.
This course is a continuation of Phonetics I and provides a more detailed survey of some areas in acoustic and articulatory phonetics. Topics include feature theory, vocal tract acoustics, quantal theory, speaker normalization, theories of speech perception, coarticulation, theories of speech production, and prosody. In addition, a number of "hands-on" projects will be part of the course.

[LING 321–322 History of the Romance Languages #
321: fall; 322: spring. 4 credits each term. Prerequisites: Linguistics 101 or equivalent and qualification in any Romance language. Offered alternate years. Next offered 1993–94.
C. Rosen.
321: Popular Latin. Pan-Romance trends in phonology, morphology, syntax, and the lexicon. Regional divergence. Non-Latin influences. Medieval diglossia and emergence of Romance standards. 322: French, Italian, and Spanish from 850 to 1250 A.D. Analysis of texts. Overview of other languages to the present day. Elements of dialectology.

LING 323 Comparative Romance Linguistics
Spring. 4 credits. Prerequisites: Linguistics 101 or equivalent, and qualification in any Romance language. Offered alternate years. Normally offered in fall.
C. Rosen.
Concise survey of Romance syntax, covering the salient constructions in six languages with equal attention to their historical evolution and their current style. Grammatical innovation and divergence in a typological perspective.

[LING 325 Pragmatics
Spring. 4 credits. Prerequisite: Linguistics 101 or permission of instructor. Not offered 1992–93.
S. McConnell-Ginet.
An introduction to the study of such topics as speech acts, presupposition, deixis, implicatures, and conversational strategies.]

LING 334 Non-Linear Syntax
Spring. 4 credits. Prerequisite: Linguistics 303 or equivalent.
C. Rosen.
Analyses of some twenty diverse languages are examined with the aim of building a formal account of the syntactic constructions existing in the world's languages, and discerning universals that delimit this inventory. Non-linear theory, designed for comparative work, depicts constructions in the abstract, not imagining them as arrays of elements in space. Simultaneously it studies the morphosyntactic systems that relate constructions to their linear realizations.

LING 366 Spanish in the United States (also Spanish 366)
Fall. 4 credits. Prerequisite: some knowledge of Spanish. Offered alternate years. Applicable toward the social science distribution requirement.
J. Lantolf.
Examination of major Spanish dialects in the United States from a linguistic perspective. Contrast with the standard language. Borrowing, interference, and code switching. Syntactic, morphological, and phonological characteristics. Sex-related phenomena.

[LING 370 Language and Cognition (also Psychology 370)
Spring. 4 credits. Prerequisite: Linguistics 101 or 264 or Psychology 215, or permission of one of the instructors. Not offered same years as Psychology 416. Not offered 1992–93.
J. Bowers.
Examination of current research on selected topics on language from both linguistic and psychological perspectives. Topics may include: Universal Grammar and language acquisition, syntactic parsing, word recognition, sentence production, aphasia, and schizophrenic language.]

LING 390 Independent Study in Linguistics
Fall or spring. 1–4 credits variable. Prerequisite: Linguistics 101 or permission of instructor.
Staff.
Independent study of linguistics topics not covered in regular curriculum for undergrads.

LING 400 Semiotics and Language (also Comparative Literature 410)
Spring. 4 credits. Prerequisite: some background in an area relevant to semiotics: e.g., linguistics, philosophy, psychology, anthropology, or literature: or permission of instructor.
L. Waugh.
An introduction to the study of semiotics in general and to particular semiotic theories (for example, those of Saussure, Peirce, Jakobson) and to language as a semiotic system. The particular topics to be discussed will depend on the interest of the students.

LING 401 Language Typology
Fall. 4 credits. Prerequisite: Linguistics 101 or equivalent.
J. Gair.
Study of a basic question of contemporary linguistics: in what ways do languages differ, and in what ways are they all alike? Efforts to formalize universals of syntax and to characterize the total repertory of constructions available to natural languages. Common morphological devices and their syntactic correlates. Emphasis on systems of case, agreement, and anaphora.

LING 403 Introduction to Applied Linguistics
Spring. 4 credits. Prerequisite: A course in the structure of a language at the 400 level.
J. Lantolf.
Examination of the theoretical bases of applied linguistics, including second-language learning and current language-teaching methodologies.

[LING 405–406 Sociolinguistics
405, fall; 406, spring. 4 credits each term. Prerequisite: Linguistics 101 or permission of instructor. Linguistics 405 is not a prerequisite to 406. Not offered 1992–93.
J. U. Wolff.
405: Social differences in the use of language according to sex, class, age, race, situation, etc. Societal multilingualism, diglossia, etc. Social attention to language: norms and standards, taboo and euphemism, and language planning. 406: the study of language variation. Theoretical and methodological issues in the study of sociolinguistic differences. Variable rules, locating variation in the grammar, and quantitative methods in linguistics.]

LING 409 Psycholinguistics of Second-Language Reading
Fall. 4 credits. Prerequisite: permission of instructor.
G. Appel.
In-depth analysis of the research on the reading process in a second language. Topics include processing of narrative vs. expository texts (descriptive, problem solving, causative, etc.); comparison of the reading process in native vs. second languages, and development of methodologies for the teaching of reading in the second-language classroom.

LING 410 Introduction to Historical Linguistics
Spring. 4 credits. Prerequisite: Linguistics 201 or permission of instructor.
J. Jasanoff.
A survey of the basic mechanisms of linguistic changes, with examples from a variety of languages.

[LING 412 Process and Knowledge in Speech Perception and Word Recognition
Spring. 4 credits. Prerequisite: Linguistics 319 or permission of instructor. Not offered 1992–93.
Staff.
This course examines how speech sounds are received and how words are recognized. The focus in the discussion of speech perception is on the question of whether speech perception requires mechanisms which are unique to it, or if instead general auditory mechanisms are sufficient. Word recognition is examined in terms of the role of phonetic and phonological processes, structures, and knowledge in recognizing words.]

[LING 418 Nonlinear Phonology
Fall. 4 credits. Prerequisite: Linguistics 301. Not offered 1992–93.
A. Cohn.
Explores a comprehensive model of phonological description arising out of work in autosegmental and metrical phonology. Particular topics include tone systems, syllable structure, quantity, stress and intonation, vowel harmony, and feature organization. These topics are related to fundamental issues in phonological theory such as naturalness, markedness, learnability, and universals. Emphasis will be placed on phonological analysis and developing familiarity with the current literature.]

[LING 420 Fundamentals of Speech Acoustics
Spring, according to demand. 4 credits. Prerequisites: Linguistics 319 and at least 1 year of college calculus, including the mathematics of complex variables. Not offered 1992–93.
Staff.
This course develops a model of vocal tract acoustics, based on the fundamental principles of acoustic theory.]

LING 421–422 Semantics I, II
421, fall; 422, spring. 4 credits each term. Prerequisites: for Linguistics 421, Linguistics 203; for Linguistics 422, Linguistics 421 or permission of instructor.
Fall: G. Chierchia. Spring: Staff.
421: an introduction to semantics of natural language. The course starts from basic foundational questions concerning the nature of meaning and the empirical domain of semantic theory. Truth-conditional and logical theories and their application to the investigation of the structure of natural languages are extensively explored (with some comparisons with other approaches). Through the study of quantification, scope, anaphora, modalities, presuppositions, and the like, one tries to gain insight into general characteristics of the cognitive apparatus that is at the basis of our capacity for understanding sentences.

422: guides students into current work in semantic theory. The first half of the course is an introduction to Montague-style semantics, whose influence on current research is quite extensive. The second half of the course focuses on selected topics that have grown out of (and sometimes against) classical Montague semantics. Such topics are usually drawn from the following: generalized quantifiers and anaphora, type-shifting, problems of tense and aspect, the linguistic relevance of algebraic approaches to properties, propositions, events and thematic roles, and discourse representation theory.

[LING 425–426 Structure of Bantu I and II] @

[LING 430 Structure of Korean @
Spring. 4 credits. Offered alternate years. Not offered 1992–93.
J. Whitman.
Intensive examination of the syntax and phonology of a non-Indo-European language with the objective of testing principles of current linguistic theory. No previous knowledge of Korean required.]

LING 431 Structure of an African Language
Fall. 4 credits. Prerequisite: Linguistics 101 or permission of the instructor.
V. Carstens.
A survey of the grammar of an African lanaguage in light of current linguistic theory.

LING 436 Language Development (also Psychology 436 and Human Development and Family Studies 436)
Spring. 4 credits. Prerequisite: at least one course in developmental psychology, cognitive psychology, cognitive development, or linquistics. Offered alternate years.
B. Lust.

A survey of basic issues, methods, and research in study of first-language acquisition. Major theoretical positions in the field are considered in the light of experimental studies in first-language acquisition of phonology, syntax, and semantics from infancy on. The fundamental linguistic issues of universal grammar and the biological foundations for acquisition are discussed, as are the issues of relations between language and thought. The acquisition of communication systems in nonhuman species such as chimpanzees are addressed, but major emphasis is on the child.

LING 440 Dravidian Structures @
Spring, according to demand. 4 credits. Prerequisite: Linguistics 101.
J. W. Gair.
A comparative and constrative analysis of the structures of several Dravidian languages.

[LING 442 Indo-Aryan Structures @
Fall, according to demand. 4 credits. Prerequisite: Linguistics 101. Not offered 1992–93.
J. W. Gair.
Typological discussion of the languages of the subfamily. Specific topics and emphasis may vary depending on the interest of the students.]

[LING 443–444 Linguistic Structure of Russian (also Russian 403–404)
443, fall; 444, spring. 4 credits each term. Prerequisites for Linguistics 443, permission of instructor and Linguistics 101; for Linguistics 444, Linguistics 443 or equivalent. Offered alternate years. Not offered 1992–93.
Staff.
A synchronic analysis of the structure of modern Russian. Linguistics 443 deals primarily with morphology and its relation to syntax and 444 with syntax and word order. Topics covered include case theory, the functions of word order, voice, agreement, impersonal constructions, negation, nonuniversal categories, and the relation between morphology and syntax.]

[LING 450 Computational Linguistics
Fall. 4 credits. Prerequisite: Linguistics 203. Not offered 1992–93.
F. Landman.
In this course we will study questions concerning the generative capacity, learnability, and parsing of different syntactic models. Some knowledge of recent developments in syntax is important. Some knowledge of mathematical linguistics may be helpful, but is not required. The course is meant for graduate students and advanced undergraduate students in linguistics, but may also be of interest to students in psychology/psycholinguistics, computer science, and cognitive studies.]

LING 493 Honors Thesis Research
Fall. 4 credits.
Staff.
May be taken before or after Linguistics 494, or may be taken independently.

LING 494 Honors Thesis Research
Spring. 4 credits.
Staff.
May be taken as a continuation of, or before, Linguistics 493.

LING 514 Syntax of African Languages
Spring. 4 credits. Prerequisites: Linguistics 101 and permission of instructor.
V. Carstens.
Selected topics in the syntax of African languages.

LING 600 Field Methods
Fall or spring. 4 credits. Prerequisite: Linguistics 101 or 319.
G. Diffloth.
Elicitation, recording, and analysis of data from a native speaker of a non-Western language not generally known to students.

LING 601 Topics in Phonological Theory
Spring. 4 credits. Prerequisites: Linguistics 301 and one higher-level course in phonology.
Staff.
Selected topics in current phonological theory.

[LING 603 History of Linguistics
Fall. 4 credits. Not offered 1992–93.
Staff.
The history of linguistics from early Greek and Sanskrit grammarians to the modern period.]

LING 604 Research Workshop
Fall. 4 credits. Prerequisite: three or more semesters of graduate study in linguistics.
Staff.
Participants will present their own ongoing research and discuss it with their colleagues. Individual topics will be chosen on the basis of interest, experience, and probable focus of dissertation research.

LING 607 Twentieth-Century Linguistics
Spring. 4 credits. Prerequisite: at least one course in linguistics or permission of instructor.
L. Waugh.
The development of 20th-century linguistics in America and Europe.

[LING 608 Discourse Analysis
Fall. 4 credits. Prerequisite: permission of instructor. Not offered 1992–93.
Staff.
Linguistic theory applied to relationships beyond the sentence.]

[LING 609 Greek Comparative Grammar (also Classics 421)
Fall. 4 credits. Prerequisite: thorough familiarity with the morphology of classical Greek. Next offered 1993–94.
A. Nussbaum.
The prehistory and evolution of the sounds and forms of ancient Greek as reconstructed by comparison with the other Indo-European languages.]

[LING 610 Latin Comparative Grammar (also Classics 422)
Fall or spring. 4 credits. Prerequisite: thorough familiarity with the morphology of classical Latin. Next offered 1993–94.
A. Nussbaum.
The prehistory and evolution of the sounds and forms of classical Latin as reconstructed by comparison with the other Indo-European languages.]

LING 611 Greek Dialects (also Classics 425)
Fall. 4 credits.
A. Nussbaum.
A survey of the dialects of ancient Greek through the reading and analysis of representative epigraphical and literary texts.

[LING 612 Italic Dialects (also Classics 424)
Fall. 4 credits. Not offered 1992–93.
A. Nussbaum.
The phonology and morphology of Faliscan, Oscan, and Umbrian studied through the reading of epigraphical texts. Attention to the relations of these languages to Latin and the question of proto-Italic.]

[LING 613 Homeric Philology (also Classics 427)
Fall. 4 credits. Prerequisite: ability to read Homeric Greek. Not offered 1992–93.
A. Nussbaum.
The language of the Homeric epics: dialect background, archaisms, epicisms, and modernizations. The notion of a Kunstsprache: its constitution, use, and internal consistency. The phonological and morphological aspects of epic compositional technique.]

LING 614 Archaic Latin (also Classics 426)
Spring. 4 credits. Prerequisite: reading knowledge of Latin.
A. Nussbaum.
Reading of epigraphic and literary preclassical texts with special attention to archaic and dialectal features. The position of Latin among the Indo-European languages of ancient Italy, the rudiments of Latin historical grammar, and aspects of the development of the literary language.

[LING 615 Mycenaean Greek (also Classics 429)
Fall or spring. 4 credits. Prerequisite: thorough familiarity with the morphology of classical Greek. Not offered 1992–93.
A. Nussbaum.
An introduction to the epigraphy, language, and content of the Linear B tablets with special attention to their implications for Greek historical grammar and dialectology.]

[LING 617–618 Hittite
617, fall; 618, spring. 4 credits each term. Prerequisites: for Linguistics 617, permission of instructor; for Linguistics 618, Linguistics 617 or permission of instructor. Not offered 1992–93.
J. Jasanoff.]

[LING 619 Rigveda
Fall. 4 credits. Not offered 1992–93.
J. Jasanoff.
Reading and linguistic analysis of selected Vedic hymns.]

[LING 620 Area Topics in Romance Linguistics
Spring. 4 credits. May be repeated for credit. Offered alternate years. Not offered 1992–93.
C. Rosen.]

[LING 621 Problems and Methods in Romance Linguistics
Fall. 4 credits. Prerequisites: Linguistics 101 or equivalent and qualification in two Romance languages. Offered alternate years. Not offered 1992–93.
C. Rosen.]

[LING 623–624 Old Irish
623, fall; 624, spring. 4 credits each term. Prerequisite for 624: 623 or permission of instructor. Not offered 1992–93.
J. Jasanoff.]

[LING 625–626 Middle Welsh]

[LING 627 Advanced Old Irish]

[LING 631 Comparative Indo-European Linguistics
Fall. 4 credits. Prerequisite: permission of instructor. Not offered 1992–93.
J. Jasanoff.
An introduction to the comparative grammar of the Indo-European languages.]

LING 633 Seminar in First-Language Acquisition: Cross-linguistic Studies of the Acquisition of Anaphora (also Human Development and Family Studies 633)
Fall. 1–4 credits. Prerequisite: Linguistics 436 or equivalent or permission of instructor.
B. Lust.
This seminar will review and critique current theoretical and experimental studies of the first-language acquisition of anaphora, with a concentration on insights gained by cross-linguistic study of this area. The seminar will forcus on relating current developments in linguistic theory regarding anaphora to current experimental research on first-language acquisition of anaphora. Attention will also be given to the development of research proposals.

LING 635–636 Indo-European Workshop
635, fall; 636, spring. 4 credits each term. Prerequisite: permission of instructor.
Fall: J. Jasanoff; spring: A. Nussbaum.
An assortment of subjects intended for students with previous training in Indo-European linguistics: problems in the reconstruction of Proto Indo-European, topics in the historical grammars of the various IE languages, reading and historical linguistic analysis of texts, and grammatical sketches of "minor" IE languages.

LING 647–648 Speech Synthesis by Rule
[647, fall;] 648, spring. 4 credits each term. Prerequisite: Linguistics 301, 319, or permission of instructor. Offered alternate years.
S. R. Hertz.
Investigates the nature of the acoustic structure of speech sythesis, using speech as a tool for exploring this structure. A particular acoustic model will be proposed, developed, and motivated by considering the relationship between phonological and acoustic structure, speech timing, phonetic universals, coarticulation, and speech perception. The primary tool for investigation will be the Delta System, a powerful software system for investigating phonology and phonetics through speech synthesis. The course is meant for graduate students and advanced undergraduate students in linguistics, but may also be of interest to students in psychology/psycholinguistics, computer science, and cognitive studies.

[LING 651–652 Old Javanese
Fall or spring, according to demand. 4 credits. Not offered 1992–93.
J. U. Wolff.
Grammar and reading of basic texts.]

LING 653–654 Seminar in Southeast Asian Linguistics
653, fall; 654, spring. 4 credits each term. Prerequisite: Linguistics 303 or permission of instructor. Linguistics 653 is not a prerequisite for 654.
G. Diffloth.
Languages of mainland Southeast Asia. Topics, chosen according to student interests, may include description, dialectology, typology, comparative reconstruction, and historical studies.

[LING 655–656 Seminar in Austronesian Linguistics
655, fall; 656, spring. 4 credits each term. Prerequisites: for Linguistics 655, Linguistics 101 and permission of instructor; for Linguistics 656, Linguistics 655. Not offered 1992–93.
J. U. Wolff.
Descriptive and comparative studies of Malayo-Polynesian languages.]

LING 657–658 Seminar in Austroasiatic Linguistics
657, fall; 658, spring. 4 credits each term. Prerequisites: Linguistics 101 or permission of instructor.
G. Diffloth.
Descriptive and comparative studies of Austroasiatic languages.

LING 700 Seminar
Fall or spring, according to demand. Credit to be arranged.
Hours to be arranged. Staff.
Seminars are offered according to faculty interest and student demand. Topics in recent years have included subject and topic, Montague grammar, speech synthesis, lexicography, classical and autonomous phonology, Japanese sociolinguistics, relational grammar, semantics and semiotics, and others.

LING 701–702 Directed Research
701, fall; 702, spring. 1–4 credits.
Hours to be arranged. Staff.

LING 773–774 Proseminar in Cognitive Studies II (also Computer Science 774)
773 fall; 774 spring. 2 credits each term.
Staff.
The focus will be on the contribution of linguistics, computer science, and neuroscience to the study of cognition. Topics may include the phonology, syntax, and semantics of natural language; artifical intelligence work in natural language processing, vision, and reasoning; parallel distributed processing; and neuropsychology.

Additional Linguistics Courses

[Chinese 401 History of the Chinese Language]
[Chinese 403 Linguistic Structure of Chinese I]
Chinese 404 Linguistic Structure of Chinese II
[Chinese 405 Chinese Dialects]
Chinese 607 Chinese Dialect Seminar
[French 401 History of the French Language]
[French 407 Applied Linguistics: French]
[French 408 Linguistic Structure of French]
French 410 Semantic Structure of French
French 604 Contemporary Theories of French Grammar
French 700 Seminar in French Linguistics
[German 401 Introduction to Germanic Linguistics]
[German 402 History of the German Language]
[German 403 Modern German Phonology]
[German 404 Modern German Syntax]
[German 406 Runology]
German 407 Teaching German as a Foreign Language
[German 602 Gothic]
[German 603 Old High German, Old Saxon]
[German 605 Structure of Old English]
[German 606 Topics in Historical Germanic Phonology]
[German 607 Topics in Historical Germanic Morphology]
[German 608 Topics in Historical Germanic Syntax]
German 609–610 Old Norse
German 611 Readings in Old High German and Old Saxon
[German 710 Seminar in Germanic Linguistics]
German 720 Seminar in Comparative Germanic Linguistics
[German 730 Seminar in German Linguistics]
[Hindi 700 Seminar in Hindi Linguistics]
[Indonesian 300 Linguistic Structure of Indonesian]
[Italian 403 Linguistic Structure of Italian]
Italian 404 History of the Italian Language
[Italian 631 Readings in Italian Opera Libretti]
Japanese 404 Linguistic Structure of Japanese
Japanese 410 History of Japanese Language
Khmer 403–404 Structure of Khmer
[Quechua 403 Linguistic Structure of Quechua]
[Quechua 700 Seminar in Quechua Linguistics]
[Russian 301–302 Advanced Russian Grammar and Reading]
[Russian 401–402 History of the Russian Language]
[Russian 403–404 Linguistic Structure of Russian]
Russian 409 Teaching Russian as a Foreign Language
[Russian 601 Old Church Slavic]
[Russian 602 Old Russian]
Russian 651–652 Comparative Slavic Linguistics
Russian 700 Seminar in Slavic Linguistics
[Spanish 401 History of the Spanish Language]
Spanish 407 Applied Linguistics: Spanish
[Spanish 408 The Grammatical Structure of Spanish]
Spanish 601 Hispanic Dialectology
Spanish 700 Seminar in Spanish Linguistics
[Tagalog 300 Linguistic Structure of Tagalog]

Mandinka

Fees. A small fee may be charged for photocopied texts for course work.

MANDI 121–122 Elementary Mandinka (also Africana Studies and Research Center)
121, fall; 122, spring. 4 credits each term. Prerequisite: for Mandinka 122, 121 or examination.
V. Carstens and staff.
Foundations provided in all basic language skills, with an emphasis on speech and aural comprehension. Classes provide speaking and listening practice.

MANDI 123 Continuing Mandinka (also Africana Studies and Research Center)
Fall. 4 credits. Prerequisite: Mandinka 122 or equivalent.
V. Carstens and staff.
Building on 121–122, this is an all-skills course with a functional emphasis. Class will be conversational.

MANDI 203 Intermediate Mandinka (also Africana Studies and Research Center)
Spring. 3 credits. Prerequisite: Mandinka 123 or equivalent.
V. Carstens and staff.

Nepali

Fees. A small fee may be charged for photocopied texts for course work.

NEPAL 101–102 Elementary Nepali
101, fall; 102, spring. 6 credits each term. Prerequisite: for Nepali 102, 101 or examination.
S. Oja.
Intended for beginners. The emphasis is on basic grammar, speaking and comprehension skills, utilizing culturally appropriate materials and texts. Devanagari script for reading and writing is also introduced.

NEPAL 160 Intensive Nepali
Summer only. 10 credits. Intended for beginners. Offered alternate years.
S. Oja.
Emphasis will be on the spoken language, in dialogues, exercises, and conversation practice. In addition, however, special attention is given to assisting students to develop vocabularies and abilities appropriate to their unique professional needs. Reading and writing practice use both colloquial and scholarly materials in the Nepali (Devanagari) script.

NEPAL 201–202 Intermediate Nepali Conversation @
201, fall; 202, spring. 3 credits each term. Prerequisites: for Nepali 201, Nepali 102 or examination; for Nepali 202, Nepali 201 or examination.
S. Oja.
Intermediate instruction in spoken grammar and verbal comprehension skills, with special attention to developing technical vocabularies and other verbal skills appropriate to students' professional fields.

NEPAL 203–204 Intermediate Nepali Composition @
203, fall; 204, spring. 3 credits each term. Prerequisites: for Nepali 203, Nepali 102 or examination; for Nepali 204, Nepali 203 or examination.
S. Oja.
A systematic review of written grammar and reading comprehension, with special attention to the technical vocabularies, necessary writing skills, and published materials typical of advanced students' professional fields.

Pali

PALI 131–132 Elementary Pali
131, fall; 132, spring. 3 credits each term.
J. Gair.
131 is an introduction to the language of the canonical texts of Theravada Buddhism. Reading of authentic texts of Theravada Buddhism. Emphasis on both content and grammatical structure. Familiarity with Sanskrit is not required. **132** is a continuation of 131 with further readings.

Polish

Fees. A small fee may be charged for photocopied texts for course work.

POLSH 131–132 Elementary Polish
131, fall; 132, spring. 3 credits each term. Prerequisite for Polish 132: Polish 131 or equivalent. Offered alternate years.
E. W. Browne.

[POLSH 133–134 Continuing Polish
133, fall; 134, spring. 3 credits each term. Prerequisites: for Polish 133, Polish 132 or equivalent; for Polish 134, Polish 133 or equivalent. Offered alternate years. Not offered 1992–93.
E. W. Browne.]

Portuguese

Fees. A small fee may be charged for photocopied texts for course work.

PORT 121–122 Elementary Portuguese
121, fall; 122, spring. 4 credits each term. Intended for beginners. Students may attain qualification upon completion of 122 by achieving a satisfactory score on a special examination.
J. Oliveira.
A thorough grounding is given in all the language skills: listening, speaking, reading, and writing.

PORT 203–204 Intermediate Composition and Conversation @
203, fall; 204, spring. 3 credits each term. Prerequisites: for Portuguese 203, Portuguese 122 or permission of instructor; for Portuguese 204, Portuguese 203 or permission of instructor.
J. Oliveira.
Conversational grammar review with special attention to pronunciation and the development of accurate and idiomatic oral expression. Includes readings in contemporary Portuguese and Brazilian prose and writing practice.

PORT 303–304 Advanced Composition and Conversation @
303, fall; 304, spring. 4 credits each term. Prerequisites: for Portuguese 303, Portuguese 204 or equivalent; for Portuguese 304, Portuguese 303 or equivalent.
J. Oliveira.

Quechua

Fees. A small fee may be charged for photocopied texts for course work.

QUECH 131–132 Elementary Quechua
131, fall; 132, spring. 3 credits each term. Prerequisite: qualification in Spanish.
L. Morató Peña.
A beginning conversation course in the Cuzco dialect of Quechua.

QUECH 133–134 Continuing Quechua
133, fall; 134, spring. 3 credits each term. Prerequisites: for Quechua 133, Quechua 131–132 or equivalent; for Quechua 134; Quechua 133 or equivalent.
L. Morató Peña.
An intermediate conversation and reading course. Study of the Huarochiri manuscript.

[QUECH 135–136 Quechua Writing Lab
135, fall; 136, spring. 1 credit each term. Prerequisites: concurrent enrollment in Quechua 131–132 or instructor's approval. Letter grade only.
Staff.
Computer-assisted drill and writing instruction in elementary Quechua.]

[QUECH 403 Linguistic Structure of Quechua
Fall. 4 credits.
Staff.
Survey of the grammatical structure of Quechua dialects.]

[QUECH 700 Seminar in Quechua Linguistics
Fall or spring. Credit to be arranged. Prerequisite: permission of instructor.
Staff.]

Romance Linguistics

[LING 321–322 History of the Romance Languages #
321, fall; 322, spring. 4 credits. Prerequisite for 321: Linguistics 101 or equivalent, and qualification in any Romance language. Offered alternate years. Next offered 1993–94.
C. Rosen.
For description see Linguistics 321.]

LING 323 Comparative Romance Linguistics
Spring. 4 credits. Prerequisites: Linguistics 101 or equivalent and qualification in any Romance language. Offered alternate years. Normally offered in fall.
C. Rosen.
For description see Linguistics 323.

[LING 620 Area Topics in Romance Linguistics
Spring. 4 credits. May be repeated for credit. Offered alternate years. Not offered 1992–93.
C. Rosen.
For description see Linguistics 620.]

[LING 621 Problems and Methods in Romance Linguistics
Fall. 4 credits. Prerequisites: Linguistics 101 or equivalent and qualification in two Romance languages. Offered alternate years. Not offered 1992–93.
C. Rosen.
For description see Linguistics 621.]

Romanian

Fees. A small fee may be charged for photocopied texts for course work.

[ROMAN 131–132 Elementary Romanian
131, fall; 132, spring. Offered according to demand. 3 credits. Prerequisite for Romanian 132: Romanian 131 or equivalent. Not offered 1992–93.]

[ROMAN 133–134 Continuing Romanian
133, fall; 134, spring. Offered according to demand. 3 credits. Prerequisite for Romanian 134: Romanian 133 or equivalent. Not offered 1992–93.]

Russian

E. W. Browne, R. L. Leed, S. Paperno (director of undergraduate studies, 303A Morrill Hall, 255-0711).

For literature courses see Russian Literature.

The Russian Major

See Russian Literature.

Study Abroad

Cornell is an affiliated institution in the Council on International Education Exchange program for Russian language study at Leningrad State University. Cornell students also frequently go on the American Council of Teachers of Russian program in Moscow and other Russian language programs. Opportunities are available for study during the summer, a single semester, or the full year. Further information is available from Professor Patricia Carden or Diane Williams, 236 Goldwin Smith Hall.

Honors. Students taking honors in Russian undertake individual reading and research and write an honors essay.

Freshman Writing Seminar Requirement

See Russian Literature.

Russian and Soviet Studies Major

See "Special Programs and Interdisciplinary Studies," which follows the department listings.

Fees. A small fee may be charged for photocopied texts for course work.

RUSSA 103–104 Conversation Practice
103, fall; 104, spring. 2 credits each term. Must enroll in one section of 103 and one section of 121.
S. Paperno and staff.

RUSSA 121–122 Elementary Russian
121, fall or summer; 122, spring or summer. 4 credits each term. May be taken alone and qualification will be achieved with satisfactory completion of 121–122–123; or may be taken concurrently with 103–104 and qualification will be achieved at completion of 122–104.
S. Paperno and staff.
A thorough grounding is given in all the language skills: listening, speaking, reading, and writing.

RUSSA 123 Continuing Russian
Fall . 4 credits. Limited to students who have previously studied Russian and have a CPT achievement score between 450 and 559 or the equivalent. Satisfactory completion of Russian 123 fulfills the qualification portion of the language requirements.
S. Paperno and staff.
A prequalification course designed to prepare students for study at the 200 level. Passing this course is equivalent to qualification.

RUSSA 203–204 Intermediate Composition and Conversation
203, fall, spring or summer; 204, spring. 3 credits each term. Prerequisite: qualification in Russian (Russian 123 or CPT score 560–649). Prerequisite for Russian 204: Russian 203 or equivalent.
L. Paperno, S. Paperno, and V. Tsimberov.
Guided conversation, composition, reading, pronunciation, and grammar review, emphasizing the development of accurate and idiomatic expression in the language.

RUSSA 205–206 Reading Russian Press
205, fall; 206, spring. 2 credits each term. Prerequisite: qualification in Russian (Russian 122 or 123 or CPT score 560–649). Both semesters must be taken in order to satisfy the proficiency level for the language requirement. This course cannot be used to satisfy the humanities requirement.
S. Paperno.
Reading unabridged articles on a variety of topics from current Russian periodicals.

Note: Students placed in the 200-level courses also have the option of taking courses in introductory literature; see separate listings under Russian 201 and 202 for descriptions of these courses, any of which may be taken concurrently with the 203–204 and 205–206 language courses described above. The introductory literature courses are offered by the Department of Russian Literature, and the 203–204 and 205–206 language courses by the Department of Modern Languages and Linguistics.

[RUSSA 301–302 Advanced Russian Grammar and Reading
301, fall; 302, spring. 4 credits each term. Prerequisites: for Russian 301, second-year Russian or permission of instructor; for Russian 302, Russian 301. Offered alternate years. Not offered 1992–93.
Staff.
This course is intended primarily to increase the student's active command of difficult Russian syntactic constructions. Special attention is paid to word order, impersonal sentences, voice, negation, participles, gerunds, and also to building active vocabulary through reading modern Russian prose. Problems of phonology are also discussed.]

RUSSA 303–304 Advanced Composition and Conversation
303, fall; 304, spring. 4 credits each term. Prerequisites: for Russian 303, Russian 204 or equivalent; for Russian 304, Russian 303 or equivalent.
L. Paperno, S. Paperno, and V. Tsimberov.
Grammar review, reading, viewing, and listening to authentic language materials (newpapers, TV, radio).

RUSSA 305–306 Directed Individual Study
305, fall; 306, spring. 2 credits each term. Prerequisites: for Russian 305, Russian 303–304 or equivalent; for Russian 306, Russian 305.
Staff.

RUSSA 309–310 Advanced Reading
309, fall; 310, spring. 4 credits each term. Prerequisites: for Russian 309, Russian 204; for Russian 310, Russian 303.
L. Paperno.
The purpose of the course is to teach advanced reading skills. The weekly reading assignment is about 40 pages of unabridged Russian prose of the 20th century. The discussion of the reading is conducted entirely in Russian and is centered around the content of the assigned selection.

[RUSSA 401–402 History of the Russian Language #
401, fall; 402, spring. 4 credits each term. Prerequisites: for Russian 401, permission of instructor; for Russian 402, Russian 401 or equivalent. Offered alternate years. Not offered 1992–93.
Staff.
Phonological, morphological, and syntactic developments from Old Russian to modern Russian.]

[RUSSA 403–404 Linguistic Structure of Russian (also Linguistics 443–444)
403, fall; 404, spring. 4 credits each term. Prerequisites: for Russian 403, permission of instructor, Linguistics 101 recommended; for Russian 404, Russian 403 or equivalent. Offered alternate years. Not offered 1992–93.
Staff.
A synchronic analysis of the structure of modern Russian. Russian 403 deals primarily with morphology and its relation to syntax and 404 with syntax and word order. Topics covered include case theory, the functions of word order, voice, agreement, impersonal constructions, negation, nonuniversal and the relation between morphology and syntax.]

RUSSA 407–408 Russian Phonetics
407, fall; 408, spring. 4 credits. Prerequisite: Russian 204.
R. Leed.
Treats both the practical and theoretical aspects of Russian phonetics. Lab work includes the use of the computer for acoustic phonetics, primarily for undergraduate majors in Russian and for graduate students in Slavic linguistics and Russian literature.

RUSSA 409 Teaching Russian as a Foreign Language
Fall or spring. 1 credit. Prerequisite: very good command of Russian.
S. Paperno.
Designed to equip the teacher of Russian with the ability to apply current knowledge and practice language instruction in the classroom.

RUSSA 413–414 Advanced Conversation and Stylistics
413, fall; 414, spring. 2 credits each term. Prerequisites: for Russian 413, Russian 303–304 or the equivalent, for Russian 414, Russian 413.
L. Paperno, S. Paperno, or V. Tsimberov.
Discussion of authentic unabridged Russian texts and TV series in a variety of nonliterary styles and genres.

[RUSSA 601 Old Church Slavic
Fall. 4 credits. This course is prerequisite to Russian 602. Offered alternate years. Not offered 1992–93.
E. W. Browne.
Grammar and reading of basic texts.]

[RUSSA 602 Old Russian Texts
Spring. 4 credits. Prerequisite: Russian 601. Offered alternate years. Not offered 1992–93.
E. W. Browne.
Grammatical analysis and close reading of Old Russian texts.]

RUSSA 633–634 Russian for Graduate Specialists
633, fall; 634, spring. 2 credits each term. Prerequisite: four years of college Russian. For graduate and advanced undergraduate students.
L. Paperno and S. Paperno.
The course is designed for graduate students who specialize in an area of Russian studies requiring fine active control of the language. Students will have an opportunity to speak formally and informally on topics in their specialty. Fine points of syntax, usage, and style will be discussed.

RUSSA 651–652 Comparative Slavic Linguistics
651, fall; 652, spring. 4 credits each term. Prerequisites: for Russian 651, Russian 601 taken previously or simultaneously or permission of instructor; for Russian 652, Russian 651 or permission of instructor. Offered alternate years.
E. W. Browne.
Sounds and forms of the Slavic languages and of prehistoric common Slavic; main historical developments leading to the modern languages.

RUSSA 700 Seminar in Slavic Linguistics
Offered according to demand. Variable credit.
R. Leed.
Topics chosen according to the interests of staff and students.

Sanskrit

[SANSK 131–132 Elementary Sanskrit (also Classics 131–132)
131, fall; 132, spring. 4 credits each term. Not offered 1992–93.
C. Minkowski.
An introduction to the essentials of Sanskrit grammar. Designed to enable the student to read classical and epic Sanskrit as quickly as possible.]

SANSK 251–252 Intermediate Sanskrit (also Classics 251–252) @#
251, fall; 252, spring. 3 credits each term. Prerequisite: Sanskrit 132 or equivalent.
Fall: J. Jasanoff; spring: C. Minkowski.
Readings from the literature of Classical Sanskrit. Fall: Selections from the two Sanskrit epics, the *Mahabharata* and the *Ramayana*. Spring: More selections from the epics and selections from either Sanskrit story literature or from Sanskrit dramas.

Serbo-Croatian

Fees. A small fee may be charged for photocopied texts for course work.

[SEBCR 131–132 Elementary Serbo-Croatian
131, fall; 132, spring. 3 credits each term. Prerequisite for Serbo-Croatian 132: Serbo-Croatian 131 or equivalent. Not offered 1992–93.
E. W. Browne.]

SEBCR 133–134 Continuing Serbo-Croatian
133, fall; 134, spring. 3 credits each term. Prerequisites: for Serbo-Croatian 133, Serbo-Croatian 132 or equivalent; for Serbo-Croatian 134, Serbo-Croatian 133 or equivalent.
E. W. Browne.

Sinhala (Sinhalese)

Fees. A small fee may be charged for photocopied texts for course work.

SINHA 101–102 Elementary Sinhala
101, fall; 102, spring. 6 credits each term. Prerequisite for Sinhala 102: Sinhala 101 or equivalent.
J. W. Gair and staff.
A semi-intensive course for beginners. A thorough grounding is given in all the language skills; listening, speaking, reading, and writing.

[SINHA 160 Intensive Sinhala
Summer only. 10 credits. Intended for beginners. Offered alternate years. Not offered 1993.
J. W. Gair and staff.
Emphasis is on the spoken (colloquial) language, the writing system is introduced and used to present all Sinhala materials, with additional reading practice with colloquial materials. A foundation is laid for later study of the written language (literary Sinhala).]

SINHA 201–202 Intermediate Sinhala Reading @
201, fall; 202, spring. 3 credits each term. Prerequisites: for Sinhala 201, Sinhala 102; for Sinhala 202, Sinhala 201 or equivalent.
J. W. Gair and staff.

SINHA 203–204 Intermediate Composition and Conversation @
203, fall; 204, spring. 3 credits each term. Prerequisites: for Sinhala 203, Sinhala 102 or permission of instructor; for Sinhala 204, Sinhala 203 or equivalent.
J. W. Gair and staff.

Related Courses

See also Linguistics 442, 631.

Spanish

J. Lantolf, M. Suñer (director of undergraduate studies, 218 Morrill Hall, 255-0714).

For advanced Spanish language and literature courses see Romance Studies.

The Major

The major is designed to give students proficiency in the oral and written language, to acquaint them with Hispanic culture, and to develop their skill in the linguistic analysis of Spanish. (For the major in Spanish literature see the description under Romance Studies.) Satisfactory completion of the major should enable students to meet language requirements for teaching, to continue with graduate work in Spanish or other appropriate disciplines, or to satisfy standards for acceptance into the training programs of the government, social agencies, and business concerns. A Spanish major combined with another discipline may also allow a student to undertake pre-professional training for graduate study in law, medicine, business, etc. Students interested in a Spanish major are encouraged to seek faculty advice as early as possible. For acceptance into the major, students should consult the director of undergraduate studies of the Department of Modern Languages and Linguistics, Professor Suñer (218 Morrill Hall), who will admit them to the major.

The Core

All majors will work out a plan of study in consultation with their advisers. Previous training and interests as well as vocational goals are taken into account when the student's program of courses is determined. Spanish 201 and 204 or 212 (or equivalent) are prerequisite to entering the major in Spanish. All majors normally include the following core courses in their programs:

1) Spanish 315–316–317

2) Spanish 311 and 312 (or equivalent)

Spanish majors have great flexibility in devising their programs of study and areas of concentration.

The Linguistic Option

Spanish linguistics, for which the program normally includes 366, 401, 407, 408, and at least 8 additional credits in general or Spanish linguistics. (Linguistics 101 is recommended before entering this program.) The J. G. White Prize and Scholarships are available annually to students who achieve excellence in Spanish.

Study Abroad in Spain

Cornell and the University of Michigan cosponsor an academic year in Spain program. Students enrolled in this program spend the first four weeks before the fall semester begins in a residential college located on the campus of the University of Madrid, where they take a course in Spanish language and contemporary society and take advantage of special lectures and field trips to Madrid and Castile. This course carries three credits. In early October the program moves to Seville, where students enroll in as many regular classes at the University of Seville as their language competency and general education permit. Their academic work is supplemented by courses designed explicitly for the program by Seville faculty, as well as a seminar regularly offered by the resident director, who is chosen from the faculty of either Cornell or Michigan. The special courses normally include history of art and architecture, Spanish composition and syntax, and modern Spanish history. In Seville students live with selected families or in a few cases in colegios mayores. Cornell-Michigan also maintains a center in Seville, which is used by students for special seminars, tutorials, lectures, and informal gatherings.

Applicants are expected to have at least completed Spanish 204 prior to departure. Students are strongly encouraged to study abroad for the entire year rather than for one semester. Students interested in the study abroad program should consult with the Cornell Abroad office for further information (474 Uris Hall, 255-6224).

Honors. Honors in Spanish may be achieved by superior students who want to undertake guided independent reading and research in an area of their choice. Students in the senior year select a member of the Spanish faculty from either the Department of Romance Studies or the Department of Modern Languages and Linguistics to supervise their work and direct the writing of their honors essays (see Spanish 429–430).

Fees. Depending on the course, a small fee may be charged for photocopied texts for course work.

SPAND 101 Basic Course I
Summer only. 6 credits.
Staff.
A thorough grounding in all language skills: listening, speaking, reading, and writing. Language practice in small groups. Lectures cover grammar, reading, and cultural information. Students who have previously studied Spanish must take the qualifying examination before registering for this course.

SPAND 121 Elementary Spanish
Fall only. 4 credits. Special sections of this course are available for students with qualification in another language. Intended for beginners or students placed by examination. Evening prelims.
Z. Iguina.
A thorough grounding is given in all language skills: listening, speaking, reading, and writing. Language practice is in small groups. Lecture covers grammar, reading, and cultural information.

SPAND 122 Elementary Spanish
Fall or spring. 4 credits. Prerequisite: Spanish 121 or CPT or SPT score between 370 and 440. Students who obtain an SPT achievement score of 560 after Spanish 122 attain qualification and may enter the 200-level sequence; otherwise Spanish 123 is required for qualification. Evening prelims.
Fall: M. Rice; spring: Z. Iquina.
A thorough grounding is given in all language skills: listening, speaking, reading, and writing. Language practice is in small groups. Lecture covers grammar, reading, and cultural information.

SPAND 123 Continuing Spanish
Fall, spring, or summer. 4 credits. Limited to students who have previously studied Spanish and have a CPT or SPT achievement score between 450 and 559 or have completed 122. Satisfactory completion of Spanish 123 fulfills the qualification portion of the language requirement. Evening prelims.
J. Routier-Pucci.
An all-skills course designed to prepare students for study at the 200 level.

SPAND 203 Intermediate Composition and Conversation
Fall, spring, or summer. 3 credits. Prerequisite: qualification in Spanish (Spanish 123 or CPT or SPT score 560–649). Not available to students who have taken Spanish 213.
D. Cruz-de Jesús.
Conversational grammar review with special attention to the development of accurate and idiomatic oral expression. Includes readings in contemporary Spanish prose and practice in writing.

SPAND 204 Intermediate Composition and Conversation
Fall or spring. 3 credits. Prerequisite: Spanish 203 or permission of instructor.
E. Dozier.
Practice in conversation with emphasis on improving oral and written command of Spanish. Includes treatment of specific problems in grammar, expository writing, and readings in contemporary prose.

SPAND 213 Intermediate Spanish for the Medical and Health Professions
Fall or spring. 3 credits. Prerequisite: qualification in Spanish (Spanish 123 or CPT or SPT score 560–649), or permission of instructor. Not available to students who have taken Spanish 203.
A. Tió.
Conversational grammar review, with dialogues, debates, compositions and readings on health-related themes. Special attention is given to relevant cultural differences. Fulfills proficiency requirement.

SPAND 310 Advanced Conversation and Pronunciation
Spring. 2 credits. Prerequisite: Spanish 204 or equivalent.
Z. Iguina.
A conversation course with intensive oral practice obtained through the production of video programs. Study of the fundamental aspects of communication in the standard spoken and written Spanish, with some focus on dialectal variations. Weekly phonetics labs to improve pronunciation.

SPAND 366 Spanish in the United States (also Linguistics 366)
Fall. 4 credits. Prerequisite: some knowledge of Spanish. Counts toward the social science distribution requirement.
J. Lantolf.
Examination of major Spanish dialects in the United States from a linguistic perspective. Contrast with the standard language. Borrowing, interference, and code switching. Syntactic, morphological, and phonological characteristics. Sex-related phenomena.

[SPAND 401 History of the Spanish Language #
Fall. 4 credits. Prerequisites: Linguistics 101 and qualification in Spanish, or permission of the instructor. Next offered 1993–94.
Staff.
A historical analysis of the phonology, morphology, syntax, and lexicon of the Spanish language up to the seventeenth century. Selected medieval documents are read and discussed.]

SPAND 407 Applied Linguistics: Spanish
Fall. 4 credits. Prerequisite: qualification in Spanish or permission of instructor.
M. Suñer.
Designed to equip the student or future teacher of Spanish with insights into problem areas for second-language learners by using linguistic descriptions.

[SPAND 408 The Grammatical Structure of Spanish
Spring. 4 credits. Prerequisites: proficiency in Spanish and Linguistics 101 or permission of instructor. Offered alternate years. Not offered 1992–93.
M. Suñer.
Survey of the salient morphological and syntactic characteristics of contemporary Spanish.]

SPAND 601 Hispanic Dialectology
Spring. 4 credits.
Staff.
Survey of dialects of Latin America and the Caribbean.

SPAND 700 Seminar in Spanish Linguistics
Fall or spring, according to demand. Variable credit.
Staff.
Topics in synchronic and diachronic Spanish linguistics.

Swahili

See listings under Africana Studies and Research Center.

Swedish

Fees. A small fee may be charged for photocopied texts for course work.

SWED 121–122 Elementary Swedish
121, fall; 122, spring. 4 credits each term. Prerequisite for 122: Swedish 121 or equivalent.
L. Trancik.
The aim of this course is to develop skills in listening, speaking, reading and writing within Sweden's cultural context.

SWED 123 Continuing Swedish
Fall. 4 credits. Prerequisite: Swedish 122 or equivalent.
L. Trancik.
Continues developing skills in spoken and written Swedish within Sweden's cultural context.

SWED 203 Intermediate Swedish
Spring. 3 credits. Prerequisite: Swedish 123 or permission of instructor.
L. Trancik.
Emphasis on development of all skills, through writing, reading and discussion of culturally significant texts. Audiovisual material will further enhance language comprehension.

SWED 204 Advanced Swedish
Fall. 3 credits. Prerequisite: Swedish 203 or permission of instructor. Taught in Swedish.
L. Trancik.
Emphasis on improving oral and written expression of Swedish. Includes enrichment of vocabulary, readings in contemporary prose, treatment of specific problems in grammar, and presentation of videos and films.

Tagalog

Fees. A small fee may be charged for photocopied texts for course work.

TAG 121–122 Elementary Tagalog
121, fall; 122, spring. 4 credits each term. Prerequisite for Tagalog 122: Tagalog 121.
J. U. Wolff and staff.
A thorough grounding is given in basic speaking and listening skills with an introduction to reading.

TAG 123 Continuing Tagalog
Fall. 4 credits. Prerequisite: Tagalog 122 or equivalent. Satisfactory completion of Tagalog 123 fulfills the qualification portion of the language requirement.
J. U. Wolff and staff.
Improves speaking skills, such as fluency and pronunciation, focusing on verbal communication skills; offering a wide range of readings and sharpening listening skills.

TAG 205–206 Intermediate Tagalog @
205, fall; 206, spring. 3 credits each term. Prerequisites: for 205, Tagalog 123 or equivalent; for Tagalog 206, Tagalog 205 or equivalent. Satisfactory completion of Tagalog 205 fulfills the proficiency portion of the language requirement.
J. U. Wolff and staff.
This course develops all four skills: reading, writing, speaking, and comprehension.

[TAG 300 Linguistic Structure of Tagalog
Fall or spring. 4 credits. Prerequisite: Linguistics 101.
J. U. Wolff.]

Tamil

Fees. A small fee may be charged for photocopied texts for course work.

[TAMIL 101–102 Elementary Tamil
101, fall; 102, spring. 6 credits each term. Offered according to demand. Prerequisite for Tamil 102, Tamil 101 or equivalent. Not offered 1992–93.
J. W. Gair and staff.]

Thai

Fees. A small fee may be charged for photocopied texts for course work.

THAI 101–102 Elementary Thai
101, fall; 102, spring. 6 credits each term. Prerequisite for Thai 102, Thai 101 or equivalent. Intended for beginners or students placed by examination.
N. Jagacinski.
A thorough grounding is given in all the language skills: listening, speaking, reading, and writing.

THAI 201–202 Intermediate Thai Reading
201, fall; 202, spring. 3 credits each term. Prerequisites: for Thai 201, Thai 102; for Thai 202, Thai 201 or equivalent.
N. Jagacinski.

THAI 203–204 Intermediate Composition and Conversation @
203, fall; 204, spring. 3 credits each term. Prerequisites: for Thai 203, Thai 102; for Thai 204, Thai 203.
N. Jagacinski.

THAI 301–302 Advanced Thai @
301, fall; 302, spring. 4 credits each term. Prerequisite: Thai 202 or equivalent.
N. Jagacinski.
Selected readings in Thai writings in various fields.

THAI 303–304 Thai Literature
303, fall; 304, spring. 4 credits each term. Prerequisite: Thai 302 or equivalent.
N. Jagacinski.
Reading of significant novels, short stories, and poetry written since 1850.

THAI 401–402 Directed Individual Study
401, fall; 402, spring. 4 credits each term. For advanced students or students with special problems or interests. Prerequisite: permission of instructor.
N. Jagacinski.

Ukrainian

Fees. A small fee may be charged for photocopied texts for course work.

[UKRAN 131–132 Elementary Ukrainian
131, fall; 132, spring. 3 credits each term. Prerequisite for Ukrainian 132, Ukrainian 131 or equivalent. Not offered 1992–93.
E. W. Browne.]

Vietnamese

Fees. A small fee may be charged for photocopied texts for course work.

VIET 101–102 Elementary Vietnamese
101, fall; 102, spring. 6 credits each term. Prerequisite for Vietnamese 102, Vietnamese 101 or equivalent. Intended for beginners or students placed by examination.
Staff.

VIET 201–202 Intermediate Vietnamese Reading
201, fall; 202, spring. 3 credits each term. Prerequisites: for Vietnamese 203, Vietnamese 102: for Vietnamese 204, Vietnamese 203.
Staff.

VIET 203–204 Intermediate Composition and Conversation @
203, fall; 204, spring. 3 credits each term. Prerequisites: for Vietnamese 203, Vietnamese 102; for Vietnamese 204, Vietnamese 203.
Staff.

VIET 301–302 Advanced Vietnamese
301, fall; 302, spring. 4 credits each term. Prerequisite: Vietnamese 202 or equivalent.
Staff.

VIET 401–402 Directed Individual Study
401, fall; 402, spring. 4 credits each term. Prerequisite: permission of instructor. Intended for advanced students.
Staff.

Yoruba

Fees. A small fee may be charged for photocopied texts for course work.

YORUB 121–122 Elementary Yoruba (also Africana Studies and Research Center 131–132)
121, fall; 122, spring. 4 credits each term. Prerequisite for Yoruba 122, Yoruba 121 or equivalent.
V. Carstens and staff.

YORUB 123–203 Continuing Yoruba (also Africana Studies and Research Center 133–134)
123, fall; 203, spring. 4 credits each term. Prerequisites: for Yoruba 123, Yoruba 122 or equivalent; for Yoruba 203, Yoruba 123 or equivalent.
V. Carstens and staff.

Zulu

Fees. A small fee may be charged for photocopied texts for course work.

[ZULU 121–122 Elementary Zulu (also Africana Studies and Research Center)
121, fall; 122, spring. 4 credits each term. Prerequisites for Zulu 122, Zulu 121 or equivalent.
V. Carstens.]

[ZULU 123–203 Continuing Zulu (also Africana Studies and Research Center)
123, fall; 203, spring. 4 credits each term. Prerequisites: for Zulu 123, Zulu 122 or equivalent; for Zulu 203, Zulu 123 or equivalent.
V. Carstens.]

MUSIC

S. Stucky, chair; M. Hatch, director of undergraduate studies (110 Lincoln Hall, 255-5049), N. Zaslaw, graduate faculty representative (113 Lincoln Hall, 255-4279); V. K. Agawu, M. Bilson, D. Borden, L. Coral, M. Gilman, R. Harris-Warrick, K. Hester, J. Hsu, S. Jeneary, J. Kellock, S. Monosoff, E. Murray, R. Parker, D. R. M. Paterson, D. Randel, D. Rosen, M. Scatterday, J. Shames, R. Sierra, T. Sokol, J. Webster

Emeritus: W. Austin, K. Husa, R. Palmer, M. Stith

Musical Performance and Concerts

Musical performance is an integral part of Cornell's cultural life and an essential part of its undergraduate academic programs in music. The department encourages music making through its offerings in individual instruction and through musical organizations and ensembles that are directed and trained by members of the faculty. Students from all colleges and departments of the university join with music majors in all of these ensembles:

Big Red Marching Band
Big Red Pep Band
Chamber Music Ensembles
Collegium Musicum
Cornell Chamber Orchestra
Cornell Chorale
Cornell Chorus
Cornell Gamelan Ensemble
Cornell Jazz Ensembles
Cornell Symphony Orchestra
Cornell University Glee Club
Cornell University Symphonic Band
Cornell University Wind Ensemble
Sage Chapel Choir

Information about requirements, rehearsal hours, and conditions for academic credit can be found in the following listings for the Department of Music. Announcements of auditions are posted during registration each fall term and, where appropriate, each spring term as well.

The Department of Music and the Faculty Committee on Music sponsor more than one hundred formal and informal concerts each year by Cornell's ensembles, faculty, and students and by distinguished visiting artists. A special feature is the annual Cornell Festival of Contemporary Music. The great majority of concerts are free and open to the public. Lectures and concerts are listed in special monthly posters and the usual campus media.

Nonmajors

In addition to its performing, instructional, and concert activities, the department offers numerous courses for nonmajors, many of which carry no prerequisites and presuppose no previous formal training in music. Consult the following course listings, and for further information apply to the department office, 104 Lincoln Hall (255-4097), or to the director of undergraduate studies, Professor Martin Hatch.

The Major

Two options are available to the student planning to major in music. Each carries the study of music to an advanced level through the integration of performance, music theory, and music history. Option I is a general course, not necessarily oriented toward eventual graduate or professional work in music. Option II is a more specialized and concentrated program, suitable for students who want to prepare for graduate or professional work in music.

All students contemplating a major in music under either option should arrange for placement examinations and advising in the department as early as possible, usually during the freshman orientation period. Information is available from the director of undergraduate studies, Professor Martin Hatch, 110 Lincoln Hall (255-5049), or from the chair, Professor Steven Stucky, 106 Lincoln Hall (255-3671). All students are expected to have chosen an adviser from among the department faculty at the time of application for major status.

Option I presupposes some musical background before entering Cornell. Prerequisites for admission to the major are the satisfactory completion of Music 152, at the latest by the end of the sophomore year (the freshman year is preferable), with a final grade of C or better, including an average grade of C or better in all the musicianship components of Music 152 and failure in none of them; and the passing of a simple piano examination (details are available from the department office). Students must apply to the department for formal acceptance as a music major.

The requirements for the Bachelor of Arts degree with a major in music under Option I comprise the following:

1) in music theory:
Music 251–252, 351, and 352.
2) in music history:
sixteen credits in courses numbered at the 300 level or above listed under Music History. At least three of these courses must be drawn from the four-course sequence Music 381–384.
3) in performance:
four semesters of participation in a musical organization or ensemble sponsored by the Department of Music.

Option II presupposes considerable musical study before entering Cornell. Prerequisites for admission into the Option II program are previous acceptance as an Option I major and satisfactory completion of Music 252, normally by the end of the sophomore year. Students must apply to the department for formal acceptance as an Option II major. An Option II major concentrates in one of the three areas listed below. For Option II in performance, exceptional promise must be demonstrated, in

part by a successful solo recital before the end of the sophomore year.

The requirements for the Bachelor of Arts degree with a major in music under Option II are:

1) completion of all the requirements for Option I, except as noted below, and
2) in addition:
   a) in performance:
      (1) the requirement for four semesters of participation in a musical organization or ensemble is waived (but such majors are expected to participate actively in chamber and other ensembles sponsored by the department);
      (2) sixteen credits in individual instruction in the student's major instrument, or voice, earned by taking Music 391–392 throughout the junior and senior years
   b) in theory and composition or in history:
      (1) for two of the four semesters of participation in a musical organization or ensemble, Music 462 or 463 may be substituted;
      (2) twelve additional credits in this area of concentration at the 300 level or above, of which either four may be earned in Music 301 or 302 when taken once for four credits, or eight may be earned in Music 401–402.

Honors. The honors program in music is intended to provide special distinction for the department's ablest undergraduate majors. To become a candidate for honors in music, a student must be invited by the faculty at the beginning of the second semester of the junior year. As soon as possible thereafter, the student will form a committee of three or more faculty members to guide and evaluate the honors work. In the senior year the candidate will enroll in Music 401–402 with the chair of the honors committee as instructor. Candidates will be encouraged to formulate programs that allow them to demonstrate their musical and scholarly abilities, culminating in an honors thesis, composition, or recital, to be presented not later than April 1 of the senior year. A comprehensive examination administered by the honors candidate's committee will be held not later than May 1. The level of honors conferred will be based primarily on the candidate's performance in the honors program, and secondarily on the candidate's overall record in departmental courses and activities.

Distribution Requirement

The distribution requirement in the expressive arts may be satisfied with 6 credits in music, except freshman writing seminars. A maximum of 4 credits in Music 321–322 and a maximum of 3 credits in Music 331 through 338 and 441 through 450 may be used to satisfy this requirement.

Facilities

Music Library. The Music Library, in Lincoln Hall, has an excellent collection of standard research tools. Its holdings consist of approximately one hundred thousand books, periodicals, and scores and forty thousand sound and video recordings. Particularly noteworthy are the collections of opera from all periods; twentieth-century scores and recordings; a large microfilm collection of Renaissance sources, both theoretical and musical; and a collection of eighteenth-century chamber music. In addition, the Department of Rare Books, in Olin Library, houses a collection of early printed books on music and musical manuscripts.

Concert Halls. The Department of Music sponsors more than one hundred concerts annually. Cornell's principal concert halls are Bailey Hall Auditorium (about 2,000), Alice Statler Auditorium (about 900), Sage Chapel (about 800) and Barnes Hall Auditorium (about 280).

Rehearsal Spaces. The orchestras and bands rehearse in Bailey Hall, Barnes Hall, and Barton Hall; the Jazz Ensembles, Gamelan, and Chamber Ensembles rehearse in Lincoln Hall; and the choral ensembles are quartered in Sage Chapel. Eleven practice studios in Lincoln Hall are available for individual practice by pianists, vocalists, and instumentalists.

Twenty-two grand pianos and eight upright or studio pianos are housed in Cornell's offices, classrooms, and rehearsal spaces. In addition, our Center for Keyboard Studies includes two concert grand pianos (Steinway and Mason & Hamlin), two eighteenth-century fortepiano replicas (copies of Johann Andreas Stein and Anton Walter), an original Broadwood grand piano from 1827, an original Graff grand piano from 1825, one Dowd and one Hubbard harpsichord, and a Challis clavichord. Barnes Hall houses a chamber organ by Derwood Crocker and a self-contained tracker organ by Schlicker. A large Aeolian Skinner Organ is located in Sage Chapel and there is a Helmuth Wolff tracker organ in Anabel Taylor Chapel. The music department also owns a quartet of stringed instruments in eighteenth-century proportions, with appropriate bows.

Digital/Electronic Equipment. A Macintosh Master studio is available for graduate student use (hours to be arranged) and occasional independent study use. The software used is Performer, Professional Composer, Finale, and several Opcode patch editor/librarians. The instruments include a Yamaha KX88 MIDI Controller keyboard, a Yamaha TX802 FM synthesizer, an E-Mu Proteus XR, a Casio FZ 10M sampler and various other synthesizers. In addition, there are two MIDI work stations with additional instruments, including a Korg M1 synthesizer and an Akai S900 sampler.

Freshman Seminars

MUSIC 111 Sound, Sense, and Ideas

Fall and spring. 3 credits. Each section limited to 17 students. No prerequisites; no previous training in music required. May not be counted for the distribution requirement in the expressive arts.

T R 11:40–12:55 (fall); T R 10:10–11:25 (spring). J. Waldoff.

In speaking, writing (and even thinking) about music, we rely on language to express the structure and meaning of a complex wordless art. Conversely, in the composition and performance of vocal music, text is given expression by music. This seminar will explore relationships between words and music, focusing on texted music (song, opera, and other types of vocal music) and programmatic music (wordless music with an implied text) as well as on literature about music.

MUSIC 115 Popular Musics Today

Fall. 3 credits. Each section limited to 17 students. No prerequisites; no previous training in music required. May not be counted for the distribution requirement in the expressive arts.

T R 10:10–11:25. M. Hatch.

Readings, listening, and writing assignments on the meanings and contexts of popular music in America today, and the musical and social aspects of diverse popular repertories found in selected regions elsewhere in the Americas, in Africa, and in Asia; the definition of terms for analysis and description of music, and the similarities and differences in the styles, functions, and contexts of popular musics.

Introductory Courses

MUSIC 101 The Art of Music

Fall. 3 credits.

M W 9:05–9:55; 1-hour disc to be arranged. V. K. Agawu.

Drawing on individual works from both Western and non-Western musical traditions, this course seeks to equip students with tools for listening intelligently to music. Assigned readings will provide the necessary historical and cultural backgrounds to the works studied, while class lectures will focus on the analytical and aesthetic issues raised by the works themselves. Whenever possible, live performances by guest artists will be included. Students will be expected to recognize excerpts from pieces studied, identify salient features of form and content, and place unknown works in the appropriate stylistic categories. Students will also be expected to attend and review one or two local concerts.

MUSIC 103 Introduction to the Musics of the World @

Spring. 3 credits. No previous training in music required.

T R 11:15–12:05; 1-hour disc to be arranged. M. Hatch.

A survey of folk, popular, and art music in several regions of the world. Topics include pitch, scale, rhythm, meter, timbre, and form in instrumental and vocal music. Recordings are the main material for study; labs present opportunities to begin performance on instruments from the regions covered. In spring 1993 the course will concentrate on the musics of India and Southeast Asia.

MUSIC 105–106 Introduction to Music Theory

105, fall, spring, or summer; 106, spring. 3 credits each term. Some familiarity with music is desirable. Prerequisite for Music 106: 105 with grade of B– or better. Music 106 is limited to 50 students.

105, fall or spring: M W 9:05 plus 2 hrs to be arranged. 106, spring: M W F 12:20 plus 1 hr to be arranged. R. Parker, 105 fall; 105–106 spring. M. Scatterday and staff.

An elementary, self-contained introduction to music theory emphasizing fundamental musical techniques, theoretical concepts, and their application. Music 105: notation, pitch, meter; intervals, scales, triads; basic concepts of tonality; extensive listening to music in various styles; analysis of representative works of Bach, Mozart, Beethoven, and Debussy. Music 106: systematic introduction to writing tonal harmony and melody; ear training.

MUSIC 108 Bach to Debussy #
Spring. 3 credits. Prerequisite: Music 105 or permission of instructor.
M W 11:15; 1-hour disc to be arranged. N. Zaslaw.
A chronological survey of major works in the Western concert repertory in all genres, from works of Bach and Handel that embody the newly consolidated language of tonality to works of Mahler and Debussy that signal the beginning of new strategies for many composers of the twentieth century.

MUSIC 120 Learning Music through Digital Technology
Fall or spring. 3 credits. Enrollment limited. Prerequisite: permission of instructor.
Fall: T R 1:25–2:40 or M W F 2:30–3:20; spring. M W F 2:30–3:20. D. Borden.
This course uses selected commercially available technological resources to produce live music. The student is expected to master the Macintosh computer, several music software programs, and several synthesizers using MIDI. Each student must learn at least the bare essentials in reading music as the course progresses. There are no papers to write; homework is presented in three classroom concerts. The final is a live presentation of the student's final project in a concert open to the public.

[MUSIC 173 Music and Poetry from Dowland to Dylan #
Fall. 3 credits. Not offered 1992–93.
M W F 1:25–2:15. R. Parker
The course will consider a broad range of musical responses to poetry, with examples from each of the last four centuries. There will be an emphasis on class discussion and encouragement of live performances within class.]

Music Theory

MUSIC 151–152 Elementary Tonal Theory
151, fall; 152, spring. 5 credits each term. Prerequisite for Music 151: knowledge of the rudiments of music and some ability to perform, demonstrated through proficiency tests given on the first two days of the term (registration is provisional, contingent on passing this test). Prerequisite for Music 152: 151 or equivalent. Intended for students expecting to major in music and other qualified students. Required for admission to the music major. All students intending to major in music, especially those intending to elect Option II should if possible enroll in Music 151–152 during the freshman year.
M W F 11:15–12:05; 2 discs to be arranged. V. K. Agawu.
Detailed study of the fundamental elements of tonal music; rhythm, scales, intervals, triads; melodic movement, two-part counterpoint, harmonic progression in the chorale style of J. S. Bach; and introduction to analysis of small forms. Drill in aural discrimination, sight singing, keyboard harmony, and elementary figured bass; rhythmic, melodic, and harmonic dictation; and score reading.

MUSIC 220 Learning Counterpoint through Digital Technology
Spring. 3 credits. Enrollment limited. Prerequisite: 151/152 and/or permission of instructor.
T R 1:25–2:40. D. Borden.
This course is a study of traditional contrapuntal techniques from the fourteenth century to the present, with emphasis on the structures used by J. S. Bach. Synthesizers, samplers, MIDI, and music software will be covered.

MUSIC 245 Gamelan in Indonesian History and Cultures @
Fall or spring. 3 credits. No previous knowledge of musical notation or performance experience necessary.
M W F 1:25–2:15 or 2:30–3:20. M. Hatch.
An introduction to Indonesia through its art. Elementary techniques of performance on the Javanese *gamelan*; a general introduction to Indonesian history and cultures, and the socio-cultural contexts for the arts there. Several short papers and one longer research report are required each semester. Music 446 is available each semester as a one-credit course for those who wish to study only performance techniques on the *gamelan*.

MUSIC 251–252 Intermediate Tonal Theory
251, fall; 252, spring. 5 credits each term. Prerequisite for Music 251: 152 or the equivalent or a suitable level of performance on a proficiency test given by the department during orientation each fall term. Prerequisite for Music 252: 251.
M W F 10:10; 2 discs to be arranged. Staff.
Continuation of the study of harmony by composition and analysis, including seventh chords, secondary dominants, and chromatic harmony. Students are expected to write several short pieces in eighteenth- and nineteenth-century styles and forms, such as two-part inventions and minuets scored for string quartet. Continuation of analysis of forms, with emphasis on large forms, e.g., sonata form. Ear training, keyboard harmony, figured bass, sight singing, dictation, and score reading.

MUSIC 351 Advanced Tonal Theory
Fall. 4 credits. Prerequisite: Music 252 or permission of instructor.
M W F 11:15. E. Murray.
Inventions, chromatic harmony, analysis of larger forms and nineteenth-century music, ear training, score reading, and advanced keyboard studies, including figured bass. Students probe questions about the meaning of "theory" and "analysis" in music and in other realms of study. They question and refine their own usages of the word "tonal" in relation to older and newer music, while returning often to short pieces of Chopin with which to consider applications of tonal theory in practice.

MUSIC 352 Materials of Twentieth-Century Music
Spring. 4 credits. Prerequisite: Music 351.
M W F 10:10. R. Sierra.
Introduction to some techniques of composers from 1900 to 1950, including expanded tonal resources, atonality, and new approaches to form and rhythm. Analysis of representative smaller works by Bartok, Hindemith, Schoenberg, Stravinsky, Webern, and some American composers. Writing assignments in various styles.

MUSIC 446 Introduction to the Gamelan
Fall and spring. 1 credit each term. Enrollment limited. Prerequisite: permission of instructor; Music 446 can be repeated.
M W 1:25–2:15 or M W 2:30–3:20. M. Hatch.
Music 446 is concentrated instruction for beginning students in elementary techniques of performance on the Indonesian *gamelan*. Music 245 is a 3-credit course that complements the instruction in *gamelan* by an introduction to Indonesian history and cultures.

[MUSIC 456 Orchestration
Spring. 4 credits. Prerequisite: Music 252 or permission of instructor. Not offered 1992–93.
W 10:10–12:05. K. Husa.
A study of the instruments of the orchestra and their use in representative works from 1700 to the present. Scoring for various instrumental groups, including large orchestra. Students will occasionally attend rehearsals of Cornell musical organizations and ensembles.]

[MUSIC 462 Orchestral Conducting
Spring. 2 credits. Prerequisite: Music 352. Not offered 1992–93.
T 10:10–12:05. K. Husa.
The fundamentals of score reading and conducting technique; study of orchestral scores from baroque, classical, romantic, and contemporary periods. Occasionally the class will visit rehearsals of Cornell musical organizations.]

[MUSIC 463 Conducting
Fall. 2 credits. Prerequisite: Music 252 or permission of instructor. Not offered 1992–93.
F 1:25–2:40. T. Sokol.]

Music History

[MUSIC 217 The Organ and Its Literature #
Fall. 3 credits. Prerequisite: Music 105 or permission of instructor. Not offered 1992–93.
M W F 11:15. D. R. M. Paterson.
An analytical survey of the history of the organ, including its design and construction and its most significant repertoire.]

MUSIC 222 A Survey of Jazz
Fall. 3 credits. Enrollment limited. Prerequisite: permission of instructor.
M W F 12:20; one disc to be arranged. K. Hester.
This course will trace the evolution of jazz historically from its African roots to the current diverse spectrum of improvisational styles that form popular, Neoclassic, and Innovative contemporary jazz music.

[MUSIC 271 Monteverdi and the Birth of the Baroque #
Fall. 3 credits. Prerequisite: any three-credit music course or permission of instructor. Not offered 1992–93.
M W 10:10. N. Zaslaw.
Using as its focal point the career and music of Claudio Monteverdi (1567–1643), the course will examine the changes music underwent between the second half of the 16th century and the first half of the next century. Monteverdi's operas Orpheus and The Coronation of Poppea as well as representative canzonettas, madrigals, and church works will be studied alongside works of his contemporaries. Attention will also be paid to the social, political, and cultural contexts of the music discussed.]

[MUSIC 272 Music and the Dance (also Theatre Arts 272) #
Spring. 3 credits. Prerequisite: any three-credit music course or permission of instructor. Not offered 1992–93.
T R 9:05. R. Harris-Warrick.
This course will explore selected topics in the interrelations between music and dance in the Western tradition. Some of the areas to be examined include the influence of dance movement on musical composition, composer-choreographer relationships, and a comparison of music composed for dancing with dance music composed for listening. Examples will be drawn from the Renaissance, the baroque period, and the modern era. Students will be asked to pursue an independent project.]

MUSIC 274 Opera #
Fall. 3 credits.
M W F 10:10–11:00. R. Harris-Warrick.
An introduction to major works of the operatic repertory, with discussion of texts and theatrical performances as well as music. Video recordings will be an integral part of the course; optional trips to live performances will be scheduled where possible.

[MUSIC 275 The Choral Tradition #
Spring. 3 credits. Prerequisite: any three-credit music course or permission of instructor. Not offered 1992–93.
M W F 10:10. R. Harris-Warrick.
A survey of representative works, both sacred and secular, in the Western choral tradition from the Middle Ages to the twentieth century. Class will include discussion of performances as well as historical and stylistic issues, and will be integrated with local concert offerings whenever possible.]

[MUSIC 277 Baroque Instrumental Music #
Spring. 3 credits. Prerequisite: any three-credit music course or permission of instructor. Not offered 1992–93.
M W F 12:20. N. Zaslaw.
Topics covered will include the rise of purely instrumental music; Renaissance string bands; the English virginalists and viol consorts; the Italian violin school; the German organ school; lute and guitar music; the invention of the baroque winds, orchestra, and fortepiano; and the sonatas, concertos, and suites of Bach, Corelli, Couperin, Handel, Purcell, Rameau, Telemann, and Vivaldi.]

[MUSIC 281 Music of the Baroque Period #
Spring. 3 credits. Prerequisite: ability to read music. Not offered 1992–93.
T R 1:25–2:40. S. Monosoff.
A study of selected works by J. S. Bach and other composers of the seventeenth and eighteenth centuries, illustrating the different traditions of the various genres and the confluence of the different national styles of the period.]

[MUSIC 282 Music of the Classical Period #
3 credits. Prerequisite: any three-credit music course or permission of instructor. Not offered 1992–93.
M W 1:25. J. Webster.]

[MUSIC 283 Music of the Romantic Era #
Fall. 3 credits. Prerequisite: any three-credit music course or permission of instructor. Not offered 1992–93.
M W F 9:05. R. Parker.]

MUSIC 284 Music of the Twentieth Century
Fall. 3 credits. Prerequisite: any three-credit music course or permission of instructor.
T R 10:10–11:25. R. Sierra.
A study of selected works by leading twentieth-century composers. Readings will provide insights into historical, cultural, aesthetic, and theoretical contexts. Class lectures will consist of analytical discussions of excerpts from works. Students will be expected to know all the works on the assigned repertoire list; make intelligent guesses about others not assigned, and write effectively about broad historical and stylistic trends. There will be an extended final essay on a topic chosen by the student.

[MUSIC 285 Music in the Middle Ages #
Fall. 3 credits. Prerequisite: any three-credit music course or permission of instructor. Not offered 1992–93.
M W F 10:10. D. Randel.]

[MUSIC 286 Music in the Renaissance #
Spring. 3 credits. Prerequisite: any three-credit music course or permission of instructor. Not offered 1992–93.
M W F 10:10. D. Randel.]

MUSIC 287 Mozart #
Spring. Prerequisite: any three-credit music course or permission of instructor. 3 credits.
T R 2:55–4:10. N. Zaslaw.
A chronological tour of the life and works of Wolfgang Amadeus Mozart by means of original documents, scores, recordings, and live performances. As a postlude, an evaluation of Peter Shaffer's play and movie Amadeus will be undertaken.

[MUSIC 374 Music and Drama (also German Studies 374) #
Fall. 4 credits. Prerequisite: any three-credit music course or proficiency in German or Italian. Not offered 1992–93.
T 1:25–4:25. A. Groos, R. Parker.
A team-taught study of major works of the German and Italian repertory between 1780 and 1920. Among the issues to be considered will be source-libretto and words-music relationships, reception, and criticism. Works to be studied will include operas by Mozart, Verdi, Wagner, Puccini, and Strauss.]

[MUSIC 379 The Study of Non-Western Musics @
4 credits. Prerequisite: any three-credit music course or permission of instructor. Not offered 1992–93.
Staff.]

MUSIC 430 Music and Ritual (also ANTHR 430)
Fall. 4 credits.
W 2:30–4:25. E. Tolbert.

Music History Seminars for Majors and Qualified Non-Majors
Prerequisite: Music 152 or permission of instructor. Intended primarily for music majors, these seminars will investigate selected topics and repertories from each period in some detail. Each seminar will include listenings, readings, oral and written papers, and analyses.

[MUSIC 381 Music in Western Europe to 1700 #
Fall. 4 credits. R. Harris-Warrick. Not offered 1992–93.
T R 10:10–11:25. 1-hour section to be arranged.]

[MUSIC 382 Music of the Eighteenth Century #
Spring. 4 credits. Not offered 1992–93.
T R 2:55–4:10. N. Zaslaw.]

MUSIC 383 Music of the Nineteenth Century #
Fall. 4 credits.
T R 8:40–9:55. R. Parker.

MUSIC 384 Music of the Twentieth Century
Spring. 4 credits.
T R 10:10–11:25. D. Rosen.

MUSIC 398–399 Independent Study in Music History
398, fall; 399, spring. 4 credits. Prerequisite: Music 152 and permission of instructor.
Staff.
Advanced study of various topics in music history. Students enrolling in Music 398–399 participate in, but do not register for, an approved 200-level music history course and, in addition, pursue independent research and writing projects.

[MUSIC 413 African American Music Innovators
Fall. 4 credits. Permission of instructor. Not offered 1992–93.
R 2:30–4:30; 1-hour disc to be arranged.
K. Hester.
This course examines and experiments with methods of analyzing, appreciating, and understanding innovative art forms. Students will write three reports (with transcribed music examples or some form of accurate analytical charting, where appropriate), utilizing three different perspectives on African American Music.]

Independent Study

MUSIC 301–302 Independent Study in Music
301, fall; 302, spring. Credit to be arranged. Prerequisite: departmental approval. Presupposes experience in the proposed area of study.
Hours to be arranged. Staff.

Honors Program

MUSIC 401–402 Honors in Music
401, fall; 402, spring. 4 credits each term. Limited to honors candidates in their senior year.
Staff.

Musical Performance

Lessons without credit. The fee for a one-half hour lesson weekly, *without credit*, is $100 per term. For a one-hour lesson (or two half-hour lessons) weekly, *without credit*, the fee is $200.

MUSIC 321–322 Individual Instruction in Voice, Organ, Harpsichord, Piano, Strings, Woodwinds, and Brass
Prerequisite: Advanced students may register only after a successful audition with the instructor, usually scheduled during the first week of classes. Students may register for this course in successive years.
Students, at the sole discretion of the instructor, earn 2 credits each term for a one-hour lesson (or two half-hour lessons) weekly accompanied by an appropriate practice schedule. For every 4 credits earned in Music 321–322, the student must have earned, or currently be earning, at least 3 credits in a music course (not including Freshman

Seminars, Music 321–322, 330 through 338, 391–392, or 441 through 450); these 3 credits must be earned prior to, or simultaneously with the first 2 credits in 321–322. The fee for a one-hour lesson (or two half-hour lessons) weekly, *for credit*, is $150 per term.

Practice-room fees for twelve hours weekly are $40 *per term* and for six hours weekly are $30 *per term* for a room **with a piano.** Practice-room fees for twelve hours weekly are $20 *per term* and for six hours weekly are $10 *per term* for a room **without a piano.** The fee for the use of the pipe organ for twelve hours weekly is $75 and for six hours weekly is $50.

All fees are non-refundable once lessons begin, *even if the course is subsequently dropped*. Music majors receive a scholarship equal to the lesson fee listed above. Members of the department-sponsored performance ensembles and organizations may, with permission of the director of the organization, receive a scholarship of up to one-half the Cornell fee for the type of lessons chosen during the term. (These scholarships are intended for lessons in the student's primary performing medium.) Scholarship forms are available in the Department Office and are to be returned to the office within the first three weeks of classes.

Under certain conditions students may earn credit for lessons taken outside Cornell (Music 321h–322h). Arrangements must be made through the Department of Music office.

MUSIC 321a–322a Individual Instruction in Voice
321a, fall; 322a, spring. 2 credits each term.
Hours to be arranged. J. Kellock.
The Vocal Coaching Program (non-credit) is administered through individual choral ensembles, coordinated by M. Gilman.

MUSIC 321b–322b Individual Instruction in Organ
321b, fall; 322b, spring. 2 credits each term.
Hours to be arranged. D. R. M. Paterson.

MUSIC 321c–322c Individual Instruction in Piano
321c fall; 322c, spring. 2 credits each term.
Hours to be arranged. M. Bilson, J. Shames, and staff.

[MUSIC 321d–322d Individual Instruction in Harpsichord
321d, fall; 322d, spring. 2 credits each term. Not offered 1992–93.
Hours to be arranged. Staff.]

[MUSIC 321e–322e Individual Instruction in Violin or Viola
321e, fall; 322e, spring. 2 credits each term. Not offered 1992–93.
Hours to be arranged. S. Monosoff and staff.]

MUSIC 321f–322f Individual Instruction in Cello or Viola da Gamba
321f, fall; 322f, spring. 2 credits each term.
Hours to be arranged. J. Hsu and staff.

MUSIC 321g–322g Individual Instruction in Brass
[321g fall] 321g not offered 1992, 322g, spring. 2 credits each term.
Hours to be arranged. M. Scatterday.

MUSIC 321h–322h Individual Instruction outside Cornell
321h, fall; 322h, spring. 2 credits each term.
Staff sponsored.
All the standard orchestral and band instruments and guitar may, under certain conditions, be studied for credit with outside teachers. This course is available primarily for the study of instruments not taught at Cornell and for the use of those who for reasons of space cannot be admitted to Music 321a–g or 322a–g. Prior approval by a member of the faculty in the department is required. For information and a list of approved teachers, consult the department office, 104 Lincoln Hall.

MUSIC 391–392 Advanced Individual Instruction
391, fall; 392, spring. 4 credits each term. Open only to juniors and seniors majoring in music under Option II with concentration in performance and to graduate students. Option II majors whose lessons must be taken outside Cornell may apply to the department for financial assistance toward the cost of lessons; $150 per semester will normally be awarded to such students and a larger amount may be awarded under certain circumstances. Music 391 is not a prerequisite to 392.
Hours to be arranged. Staff.

Musical Organizations and Ensembles

Students may participate in musical organizations and ensembles throughout the year. Permission of the instructor is required, and admission is by audition only, except that the Sage Chapel Choir and the Cornell Gamelan Ensemble are open to all students without prior audition. Registration is permitted in two of these courses simultaneously and students may register in successive years, but no student may earn more than 6 credits in these courses. Membership in these musical organizations and ensembles is also open to qualified students who wish to participate without earning credit.

MUSIC 330 Marching Band
Fall. 1 credit. Prerequisite: permission of instructor.
T 9–11 pm, R F 4:45–6, plus hours to be arranged. S. Jeneary.

MUSIC 331–332 Sage Chapel Choir
331, fall or summer; 332, spring. 1 credit. No audition for admission.
M R 7–8:30 p.m., Sunday 9:30 a.m. Staff.

MUSIC 333–334 Cornell Chorus or Glee Club
333, fall; 334, spring. 1 credit. Prerequisite: permission of instructor.
Chorus (treble voices): T 7:15–9:15 p.m., plus 2 hours to be arranged. Glee Club (mens voices): W 7:15–9:15 p.m., plus 2 hours to be arranged. R. Schiller.

MUSIC 335–336 Cornell Symphony Orchestra
335, fall; 336, spring. 1 credit. Prerequisite: permission of instructor.
Rehearsals for the Cornell Symphony Orchestra: W 7:30–10 p.m. E. Murray, fall; J. Hsu, spring.

MUSIC 337–338 University Bands
337, fall; 338, spring. 1 credit. Prerequisite: permission of instructor.
Symphonic band: fall or spring, T and W 4:45–6. Wind ensemble: spring M 7:30–9:30 p.m. and R 4:45–6:30.
S. Jeneary, fall; M. Scatterday, spring.

MUSIC 339–340 Cornell Jazz Ensembles
339, fall; 340 spring. 1 credit. Prerequisite: permission of instructor.
W 6 p.m., or W 7:30 p.m., or W 9 p.m.
K. Hester.

MUSIC 421–422 Cornell Chamber Orchestra
421, fall; 422, spring. 1 credit. Prerequisite: permission of instructor.
R 5–6:30. S. Monosoff, fall; J. Hsu, spring.
Study and performance of the chamber symphonies of Haydn, Mozart, and their contemporaries. For strings, woodwinds, and horns.

MUSIC 437–438 Chamber Winds
[437, fall.] 438, spring. 1 credit each term. Prerequisites: enrollment in Symphonic Band or Wind Ensemble in the same semester as this course AND permission of instructor only. 437 not offered 1992–93.
R 4:45–6, fall and to be arranged, spring.
M. Scatterday.
A flexible instrumentation ensemble performing original woodwind, brass, and percussion music from Gabrieli brass choirs and Mozart serenades through more contemporary works such as Stravinsky's Octet or *L'Histoire Du Soldat*. The ensemble will perform on symphonic band and wind ensemble concerts in addition to several chamber concerts throughout the year.

MUSIC 441–442 Chamber Music Ensemble
441, fall; 442, spring. 1 credit. Prerequisite: permission of instructor.
To be arranged. S. Monosoff, fall; J. Hsu, spring.
Study and performance of chamber music literature: strings, winds, piano; duos, trios, quartets, etc. Emphasis on interpretation.

MUSIC 443–444 Chorale
Fall or spring. 1 credit each term. Prerequisite: permission of instructor.
F 4:30–6:15. D. Stowe.
Study and performance of selected choral music for mixed voices.

MUSIC 445 Cornell Gamelan Ensemble
Fall and spring. 1 credit each term. Enrollment limited. Prerequisite: Music 245 or 446, or permission of instructor; Music 445 can be repeated.
R 7:30–10 p.m. M. Hatch.
Advanced performance on the Javanese *gamelan*. Tape recordings of *gamelan* and elementary number notation are provided. Some instruction by Indonesian musicians is offered in most years.

[MUSIC 447–448 Collegium Musicum
447 fall; 448 spring. 1 credit. Prerequisite: permission of instructor. Not offered 1992–93.
T 5–6: 30. J. Hsu.
Study and performance of Renaissance and Baroque instrumental music. For string and wind instruments.]

Graduate Courses

Open to qualified undergraduates with permission of instructor.

MUSIC 601 Introduction to Bibliography and Research
Fall. 4 credits.
M 1:25–4:25. L. Coral.
This course explores the nature of the discipline and introduces the many types of bibliographic tools needed to pursue research in music.

[MUSIC 602 Analytical Technique
Fall. 4 credits. Not offered 1992–93.
T 2–4:30. J. Webster.
A critical survey of various analyical methods in current use. Frequent analytical assignments and class presentations.]

[MUSIC 603 Editorial Practice
Spring. 4 credits. Not offered 1992–93.
F 10:10–12:05. R. Harris-Warrick.
Fundamental techniques of source study and filiation, the nature of a musical text, and the editorial process. Opportunity to make a critical edition based on original sources.]

[MUSIC 604 Ethnomusicology: Areas of Study and Methods of Analysis
Spring. 4 credits. Open to graduate students in anthropology, linguistics, psychology, sociology, and other cognate fields with permission of instructor. Not offered 1992–93.
F 1:25–4:25. M. Hatch.
Major aspects of research into musical cultures of the world. Problems, theories, and methods, especially those affecting analytical terminology, transcription and analysis of sound events, and fieldwork.]

[MUSIC 622 Historical Performance Practicum
Spring. 4 credits. Not offered 1992–93.
R 2:30–4:25. N. Zaslaw, M. Bilson.
The study of eighteenth-century instrumental manuals and its application to modern performance.]

[MUSIC 653 Topics in Tonal Theory and Analysis
Fall. 4 credits. Not offered 1992–93.
R 1:30–4:25. V. K. Agawu.]

MUSIC 654 Topics in Post-tonal Theory and Analysis
Spring. 4 credits.
M 1:25–4:25. V. K. Agawu.
Various approaches to the post-tonal repertory will be explored, including set theory, voice leading, and rhythmic factors. Music studied will include works by Berg, Webern, Stravinsky, Dallapiccola, Boulez, and others.

[MUSIC 656 Modern Orchestration
Fall. 4 credits. Not offered 1992–93.
T 10:10–12:05. K. Husa.]

MUSIC 657–658 Composition
657, fall; 658, spring. 4 credits each term.
T 2:30–4:25. S. Stucky.

MUSIC 659–660 Composition
659, fall; 660, spring. 4 credits each term.
T 2:30–4:25. R. Sierra.

[MUSIC 662 Orchestral Conducting
Spring. 4 credits. Not offered 1992–93.
T 10:10–12:05. K. Husa.]

[MUSIC 669–670 Debussy to the Present
669, fall; 670, spring. 4 credits each term. Not offered 1992–93.
T 2:30–4:25. S. Stucky.
Topic for fall 1990: Biobibliographic, analytical, and critical approaches to the music of Witold Lutoslawski, with emphasis on the works composed since 1976 and the literature published since 1981. Comparative studies may refer to composers such as Boulez, Carter, Berio, Ligeti, and Messiaen.]

[MUSIC 677 Mozart: His Life, Works, and Times (also German 757)
Fall. 4 credits. Not offered 1992–93.
T 2:30–5. N. Zaslaw.
After an introduction to the current state of Mozart studies, students will pursue individual research projects while the seminar undertakes a group investigation of the manuscript and printed sources for, and historical context of, Mozart's Symphony in D major, K. 297.]

[MUSIC 680 Topics in Ethnomusicology
Spring. 4 credits. Not offered 1992–93.
W 2:30–4:25. M. Hatch.
Advanced readings in ethnomusicology, with attention focused on a particular topic.]

[MUSIC 681 Seminar in Medieval Music
Fall. 4 credits. Not offered 1992–93.
D. Randel.]

MUSIC 684 Seminar in Renaissance Music
684, spring. 4 credits.
R 1:25–4:25. R. Harris-Warrick.
Topic for spring 1993: the music of Josquin.

MUSIC 686 Seminar in Baroque Music
Fall. 4 credits.
W 2:30–4:25. N. Zaslaw.
An investigation of seventeenth-century concerted music in Italy, France, and Germany, from Monteverdi's *Vespro della Beata Vergine* to Bach's Weimar cantatas.

[MUSIC 687 Seminar in Classical Music
Spring. 4 credits. Not offered 1992–93.
M 1:25–4. L. Coral.
Based on auction records, publishers catalogues, and other documents, this seminar will explore the dissemination of music in the second half of the eighteenth century.]

[MUSIC 688 Seminar in Classical Music
Spring. 4 credits. Not offered 1992–93.
M 1:25–4:25. J. Webster.
Topic for 1992–93: Haydn.]

MUSIC 689 Seminar in Music of the Romantic Era
Fall. 4 credits.
R 1:25–4:25. R. Parker.
Topic: the operas of Puccini.

[MUSIC 691–692 Performance Practice
691, fall; 692, spring. 4 credits each term. Not offered 1992–93.
W 2:30. N. Zaslaw.
The rise of the orchestra in the late seventeenth and early eighteenth centuries.]

MUSIC 697–698 Independent Study and Research
697, fall; 698, spring. Credit to be arranged.
Hours to be arranged. Staff.

[MUSIC 699 Musical Notation
Fall. 4 credits. Not offered 1992–93.
N. Zaslaw, K. Husa, J. Hsu, M. Hatch.]

[MUSIC 785–786 History of Music Theory
785, fall; 786, spring. 4 credits each term. Not offered 1992–93.
J. Webster.]

[MUSIC 787 [788] History and Criticism
787, fall; 788, spring. 4 credits. Not offered 1992–93.
R 1:25–4:25. D. Rosen.
Topic: The Issue of the "Composer's Intentions."]

MUSIC 789 Liturgical Chant in the West
Spring. 4 credits.
W 1:25–4:25. D. Randel.
The formation of the major Western liturgical repertories, their interrelation, and their early history.

NEAR EASTERN STUDIES

R. Brann, chair; G. Golan, L. Kant, S. Katz, D. I. Owen (director of the Program of Jewish Studies), L. Peirce (director of undergraduate studies), D. Powers (graduate faculty representative), G. Rendsburg, N. Scharf, S. Shoer, M. Younes

Joint faculty: M. Bernal, S. H. Nasr (A. D. White Professor-at-Large), S. Telhami

The Department

The Department of Near Eastern Studies (360 Rockefeller Hall, 255-6275) offers courses in the archaeology, civilization, history, languages, and literatures of the Near East. Students are encouraged to take an interdisciplinary approach to the cultures of this region that has had such an important impact on the development of our own civilization and that plays so vital a role in today's world community. The department's course offerings treat the Near East from ancient times to the modern period and emphasize methods of historical and literary analysis. Near Eastern Studies also provides the basic courses in the Program of Jewish Studies and serves as the home of the Faculty Committee for Arabic and Islamic Studies.

Distribution Requirements

Any two Near Eastern studies history or archaeology courses at the 200 or 300 level that form a reasonable sequence or combination satisfy the distribution requirement in the social sciences or history. Any two Near Eastern studies civilization or literature courses at the 200 or 300 level that form a reasonable sequence or combination satisfy the distribution requirement in the humanities. NES 197 or 198 must be taken before declaring the major and is required for all NES department majors. NES 197 or NES 198 plus any other Near Eastern studies course will constitute a sequence to fulfill the distribution requirement in either social sciences, or humanities, depending on the second history course used in combination with 197 or 198. All 200- and 300-level language courses may fulfill the humanities requirement.

The Major

The student who majors in Near Eastern Studies may concentrate in one of the following five areas:

1. Near Eastern languages and literatures
2. Ancient Near Eastern studies
3. Judaic studies
4. Islamic studies
5. Contemporary Middle East studies

The precise sequence and combination of courses chosen to fulfill the major is selected in consultation with the adviser; all majors, however, must satisfy the following requirements (S-U options not allowed):

1) Qualification in one of the languages offered by the department

2) Eight NES courses (which may include intermediate and advanced language courses), including NES 197 or NES 198

3) Four courses in subjects related to the student's concentration. In some cases, be taken outside the department

Prospective majors should discuss their plans with the director of undergraduate studies before formally enrolling in the department. To qualify as a major, a cumulative grade average of C or better is required.

Honors. Candidates for the degree of Bachelor of Arts with honors in Near Eastern languages and literatures, Ancient Near Eastern studies, Judaic studies, or Islamic studies must fulfill the requirements of the appropriate major study and enroll in the honors course, NES 499, in the first semester of their senior year. For admission to the honors program, candidates must have a cumulative average of B+ (3.3 G.P.A.) in Near Eastern studies courses, have demonstrated superior performance overall at Cornell, and have demonstrated proficiency in at least one Near Eastern language. After consulting their major adviser, candidates should submit an outline of their proposed honors work to the department during the second semester of their junior year.

Study abroad. There are many opportunities for study in the Middle East. Cornell has agreements with the American University in Cairo, Ben-Gurion University, the University of Haifa, Hebrew University, Tel Aviv University, and Bar Alan in Israel that will permit students to enroll for a year or in some cases for a semester. Study in regular university courses in Israel will be permitted for students with adequate language preparation; otherwise, students enroll in the Overseas Study Program of the institution. Except for instruction in Arabic language and literature, courses at the American University in Cairo are taught in English. Cornell Abroad students may also have the option of undertaking independent study in the summer following their academic year abroad. Students planning to study overseas during their junior year should develop language skills during their freshman and sophomore years. Near Eastern Studies is presently working with Cornell Abroad to establish a program in Turkey and in Jordan.

Program of Jewish Studies

The field of Jewish studies encompasses a broad spectrum of disciplines that include civilization, language, literature, philology, and history. The program offers students the opportunity to take a wide variety of courses in Jewish studies whose subjects are not represented in Near Eastern Studies. Students interested in planning a program in Jewish studies should consult the director of the program in the Department of Near Eastern Studies. For complete listings and details see Program of Jewish Studies under "Special Programs and Interdisciplinary Studies."

Committee for Arabic and Islamic Studies

The Committee for Arabic and Islamic Studies was created to promote the study at Cornell of the languages, history, culture, and politics of the Middle East. The committee sponsors lectures and conferences on other topics related to its mandate. Students interested in pursuing Arabic and Islamic Studies should consult with the Director of Undergraduate Studies in the Department of Near Eastern Studies.

Freshman Seminar

NES 121–122 An Introduction to Jewish Classics (also Jewish Studies 101–102 and Religious Studies 121–122)
101, fall; 102, spring. 3 credits each semester.
M W F 1:25–2:15. Staff.

NES 125–126 The Bible as Literature in its Ancient Near Eastern Context (also Jewish Studies 125–126 and Religious Studies 125–126)
Fall 125; spring 126. 3 credits.
M W F 11:15–12:05.

NES 154 Harems, Houris, and Hashish: Western Perceptions of the Middle East
Spring. 3 credits. Freshman Seminar.
T R 1:25–2:40. D. Powers.

NES 161–162 Archaeology and National Identity
161, fall; 162, spring. 3 credits.
M W F 9:05–9:55. Staff.

Language Courses

NES 101–102 Elementary Modern Hebrew I and II (also Jewish Studies 105–106)
101, fall; 102, spring. 6 credits each term. Prerequisite for NES 102: 101 or permission of instructor. Satisfactory completion of NES 102 fulfills the qualification portion of the language requirement. Enrollment limited to 15 students in each section.
M–F Section I: 9:05–9:55; Section II: 10:10–11:00; Section III: 11:15–12:05; Section IV: 1:25–2:15. S. Shoer.
Intended for beginners (section 1 for students without any previous background). A thorough grounding is given in all the language skills, emphasizing reading, writing, grammar, listening, and speaking. (1) Oral comprehension and production: (a) in the class room—ability to understand the basic dialogues and passages without the aid of written texts, to use these texts in variation, and to create new ones; (b) in the outside world—ability to meet basic travel needs and daily routine needs, both at work and in a study situation. (2) Reading: (a) in the classroom—ability to read the texts in the lessons, as well as new texts based on materials presented in class, and to deal with extensive readings (i.e., materials based on texts presented in the classroom as well as additional contextually relevant vocabulary items); (b) in the outside world—ability to read simple road signs, train and bus schedules, menus, simple directions, etc. (3) Writing: (a) in the classroom—ability to communicate by writing short sentences and to construct short dialogues based on simple sentences or brief passages on topics included in classroom discussions; (b) in the outside world—ability to construct simple, very short letters or notes, or brief summaries or reports. (4) Culture: meet basic courtesy needs in informal situations, know basic geographic facts, and become aware of the composition of the people of the country.

NES 103 Elementary Modern Hebrew I and II (also Jewish Studies 103)
Summer (six-week session). 4 credits. Enrollment limited to 15 students.
M–F 8:30–9:45. N. Scharf.
The fundamentals of grammar, syntax, and vocabulary as applied to both conversational and written Hebrew in the modern idiom. Students are expected to know the Hebrew alphabet for the first session of class.

NES 111–112 Elementary Arabic I and II
111, fall; 112, spring. 6 credits each term. Prerequisite for Arabic 112: Arabic 111 or permission of instructor.
M–F Section I: 9:05–9:55; Section II: 11:15–12:05. M. Younes.
The course provides a thorough grounding in all language skills: listening, speaking, reading, and writing. It starts with spoken Arabic and gradually integrates Modern Standard Arabic in the form of listening and reading texts. Emphasis will be on learning the language through using it in meaningful contexts. The student who successfully completes the two-semester sequence will be able to: 1) understand and actively participate in simple conversations involving basic practical and social situations (introductions, greetings, school, home and family, work, simple instructions, etc.; 2) read Arabic material of limited complexity and variety (simple narrative and descriptive texts, directions, etc.; 3) write notes and short letters describing an event or a personal experience. An important objective of the course will be familiarizing the students with basic facts about the geography, history, and culture of the Arab world.

[NES 117–118 Elementary Turkish I and II
181, fall; 182, spring. 6 credits each term. Not offered 1992–93.]

NES 119 Elementary Arabic: An Integrated, Communicative Approach
Summer (six-week session). 8 credits.
M–F 8–10:30; 11–12:30. M. Younes.
The course provides a thorough grounding in all language skills: listening, speaking, reading, and writing. It starts with spoken Arabic and gradually integrates Modern Standard Arabic through reading texts and listening. Emphasis is on learning the language by using it in meaningful contexts. The student who successfully completes the eight-credit sequence (equivalent to two semesters of language courses) will be able to understand and participate actively in simple conversations involving basic practical and social situations (introductions, greetings, school, home and family, work, simple instructions); read Arabic material of limited complexity and variety (simple narrative and descriptive texts, directions); and write notes and short letters describing an event or a personal experience. An important objective of the course is to familiarize students with basic facts about the geography, history, and culture of the Arab world.

NES 201–202 Intermediate Modern Hebrew I and II (also Jewish Studies 201–202) @
201, fall; 202, spring. Enrollment limited to 15 students in Section I and 12 students in Section II each term. 4 credits each term. Prerequisites for NES 201, 102 or permission of instructor; for NES 202, 201 or permission of instructor. Satisfactory completion of NES 202 fulfills the proficiency portion of the language requirement.
M T W R Section I: 10:10–11; Section II: 1:25–2:15. N. Scharf.
Second-year modern Hebrew. Continued development of reading, writing, composition, listening, and speaking skills. (1) Oral comprehension and production: (a) in the

classroom—ability to carry on a conversation, listen to a short lecture, or deliver a short lecture on topics covered in the classroom or related topics; (b) in the outside world—ability to interact with speakers of Hebrew and exchange ideas on basic interests and current events, in work or study situations or informal gatherings, and to relay simple information and give directions. (2) Reading: (a) in the classroom—ability to read simplified short stories, short news items, and newspaper headlines; (b) in the outside world—ability to read short newspaper items, work directions, maps, plans, etc. (3) Writing: (a) in the classroom—ability to write short compositions, take notes in class, compose schedules, write out directions, etc.; (b) in the outside world—ability to write letters, reports, and summaries of events, and to complete questionnaires. (4) Culture: expand knowledge of culture into some areas of literature, popular culture, and historical background.

NES 211–212 Intermediate Arabic I and II @

211, fall; 212, spring. Enrollment limited to 15 students in each section. 4 credits each term. Prerequisites: for NES 211, one year of Arabic or permission of instructor; for NES 212, 211 or permission of instructor.

M T W R Section I: 10:10–11:00; Section II: 12:20–1:10. M. Younes.

A sequel to NES 111–112. Continued development of the four language skills through extensive use of graded materials on a wide variety of topics. More attention will be given to developing native-like pronunciation and to grammatical accuracy than in NES 111–112, but the main focus will be on encouraging ideas in it. The student who successfully completes 212 will be able to: 1) understand and express himself or herself in Arabic in situations beyond the basic survival needs; 2) read and comprehend written Arabic of average difficulty; 3) write a letter, a summary of a report or a reading selection, etc. An appreciation of Arabic literature and culture will be sought through the use of authentic materials.

[NES 217–218 Intermediate Turkish I and II @

217, fall; 218, spring. 4 credits each semester. Not offered 1992–93.]

NES 232–235 Elementary Biblical Hebrew (also Jewish Studies 224–225 and NES 423–424)

232, fall; 235, spring. 3 credits.

T R 8:40–9:55. Staff.

The course is intended to develop basic proficiency in reading the language of the Hebrew Bible. The first semester will focus on introductory grammar and vocabulary. The second semester will emphasize reading selected passages in the Hebrew Bible, with further development of vocabulary and grammar.

NES 301–302 Advanced Modern Hebrew I and II (also Jewish Studies 301–302) @

301, fall; 302, spring. 4 credits each term. Prerequisite for NES 301: 202 or equivalent with permission of instructor. Prerequisite for NES 302: 301 or equivalent with permission of instructor. This sequence may be used as literature to fulfill the humanities distribution requirement. Limited to 15 students.

M W F 2:30–3:20. N. Scharf.

Advanced study of Hebrew through the analysis of literary texts and expository prose. This course employs a double perspective: the language is viewed through the literature and the literature through the language. Students will develop composition skills by studying language structures, idioms, and various registers of style.

NES 311–312 Advanced Arabic I and II @

311, fall; 312, spring. 4 credits each term. Prerequisite for NES 311: NES 212 or permission of instructor; prerequisite for NES 312: NES 311. Limited to 15 students.

M W F 2:30–3:20. M. Younes.

Students will be introduced to authentic, unedited Arabic language materials ranging from short stories and novels to political speeches and writings. Emphasis will be on developing fluency in oral expression through lively discussions of socially and politically provocative issues that are presented in the reading selections. A primary objective will be increased accuracy in pronunciation and grammar.

[NES 330–331 Hieroglyphic Egyptian I and II @#

330, fall; 331, spring. 4 credits. Not offered 1992–93.]

NES 333–334 Elementary Akkadian I and II (also NES 633–634) @#

333, fall; 334, spring. 4 credits each term. Prerequisite for NES 334: 333 or permission of instructor. Prerequisite for NES 634: 633 or permission of instructor.

Hours to be arranged. D. I. Owen.

An introduction to the Semitic language of the Akkadians and Babylonians of ancient Mesopotamia. Utilizing the inductive method, students are rapidly introduced to the grammar and the cuneiform writing system of Akkadian through selected readings in the Code of Hammurapi, the Descent of Ishtar, and the Annals of Sennacherib. Secondary readings on the history and culture of Mesopotamia provide the background for the study of the language. Knowledge of another Semitic language helpful but not essential.

NES 336 Readings in Akkadian Texts (also NES 636) @#

Spring. 4 credits. Prerequisite for NES 336: 333–334. Prerequisite for 636: 633–634.

Hours to be arranged. L. Milano.

Selected readings in Akkadian texts.

[NES 337–338 Ugaritic I and II @#

337, fall; 338, spring. 4 credits. Not offered 1992–93.]

NES 400 Seminar in Advanced Hebrew (also JWST 400) @

Spring. 4 credits. Enrollment limited to 15 students. Prerequisite: NES 302/JWST 302 or permission of instructor.

T R 11:40–12:55. N. Scharf.

Continuation of work done in NES/JWST 302. Less emphasis will be placed on the study of grammar. Reading and discussing texts of cultural relevance, using articles published in Israeli newspapers and works by authors in each of the three principal genres: poetry, theater, and novels.

[NES 412 Introduction to Arabic Linguistics (also DMLL 512) @#

Spring. 4 credits. Prerequisites: one year of Arabic and an introductory course in linguistics or permission of instructor. Not offered 1992–93.]

NES 423–424 Elementary Biblical Hebrew I & II (also Jewish Studies 223–224 and Near Eastern Studies 232–235)

423, fall; 424, spring. 3 credits each term.

T R 8:40–9:55. Staff.

For description, see NES 232–235 under Near Eastern Studies, Languages.

[NES 433 Introductory Sumerian @#

Fall. 4 credits. Prerequisite. Permission of instructor. Not offered 1992–93.]

[NES 625 West Semitic Inscriptions

Fall. 4 credits. Prerequisite: knowledge of Hebrew. Not offered 1992–93.]

NES 633–634 Elementary Akkadian I and II (also NES 333–334)

633, fall; 634, spring. 4 credits each term. Prerequisite for NES 634: 633 or permission of instructor.

Hours to be arranged. D. I. Owen.

For description, see NES 333–334 under Near Eastern Studies, Languages.

NES 636 Readings in Akkadian Texts (also NES 336)

Spring. 4 credits.

For description see NES 336 under Near Eastern Studies Languages.

Archaeology

[NES 243 The History and Archaeology of Ancient Israel (also Religious Studies 243, Archaeology 243, Jewish Studies 260) @#

Spring. 4 credits. Not offered 1992–93.

T R 11:40–12:55. D. I. Owen.

A detailed survey of the history and archaeology of the land of Canaan from the traditional origins of the Israelite tribes in the early second millennium/middle Bronze Age (ca. 2000 B.C.E.) through the Babylonian exile to the arrival of Ezra and Nehemia (ca. 450 B.C.E.). Lectures on, and discussions of, Biblical and Near Eastern literary sources relating to the history of ancient Israel, as well as an analysis of the archaeological evidence, will form the basis of the course. (This course is recommended for students planning to participate in NES 364, Introduction to Field Archaeology in Israel.)]

[NES 261 Ancient Seafaring (also Archaeology 275) @#

Fall. 3 credits. Not offered 1992–93.]

NES 263 Introduction to Biblical History and Archaeology (also Archaeology 263, Jewish Studies 263, and Religious Studies 264) @#

Spring. 3 credits.

T R 1:25–2:40. D. I. Owen.

A survey of the principal archaeological developments in Canaan/Palestine from the Neolithic period (ca. 9000 B.C.E.) to the Babylonian Exile (586 B.C.E.). Includes an introduction to archaeological methodology utilized in the reconstruction of ancient cultures in the area, as well as the basic bibliography of the field. Emphasis will be placed on the use of archaeological data for the understanding of some major problems in Israelite history and archaeology, such as the dating of the cultural milieu of the patriarchs, the dating and geographical setting of the Exodus and the Israelite conquest, and the origin and history of the Philistines. Recommended for students planning to participate in excavations in Israel.

[NES 264 Agriculture and Society in the Ancient Near East @#
Spring. 3 credits. Not offered 1992–93.]

[NES 267 Mediterranean Archaeology (also Classics 219) @#
Fall. 3 credits. Not offered 1992–93.]

[NES 361 Interconnections in the Eastern Mediterranean World in Antiquity @#
Fall. 4 credits. Not offered 1992–93.]

[NES 362 The History and Archaeology of Ebla @#
Fall. 4 credits. Prerequisite: Archaeology 100 or any introductory course in ancient history or archaeology. Not offered 1992–93.]

[NES 364 Introduction to Field Archaeology in Israel (also Jewish Studies 364) @#
Summer. 6 credits.
D. I. Owen.
An introduction to archaeology fieldwork—excavation techniques, pottery analysis, and recording. Materials studied will range from the early Bronze Age to the Roman period. Emphasis also on the role archaeology plays in the reconstruction of biblical history and the various approaches used to achieve that reconstruction. On-site supervision will be supplemented by regular lectures on the history, culture, and literature of the peoples whose remains will be exposed. Requirements include regularly assigned readings and two papers. Graduate credit by special arrangement. Please contact department (255-6275) for further details.

[NES 365 The Divided Monarchy (also Jewish Studies 365) @#
Fall. 4 credits. Prerequisite: NES 243 or permission of instructor. Not offered 1992–93.]

[NES 366 The History and Archaeology of the Ancient Near East (also Archaeology 310) @#
Fall. 4 credits. Not offered 1992–93.]

[NES 367 The History and Archaeology of Ancient Egypt @#
Fall. 4 credits. Not offered 1992–93.]

[NES 461 Seminar in Syro-Palestinian Archaeology: The Israelite Conquest of Canaan (also Jewish Studies 461) @#
Fall. 4 credits. Not offered 1992–93.]

NES 364 The Material Culture of a Syrian City State in the Third Millennium B.C.E. (also Society for the Humanities 405)
Fall. 3 credits.
W 2:30–4:25. Lucio Milano.
This seminar will focus on the epigraphical and archaeological evidence from the early Bronze Age site of Tell Mardikh/Ebla, considered a case study for investigating the relationship between the technical terminology attested in the administrative texts and the artifacts and objects from the excavations.

Civilization

[NES 157 Introduction to Islamic Civilization @#
Fall. 3 credits. Not offered 1992–93.]

NES 197 –[198] Introduction to Near Eastern Civilization (also Religious Studies 197) @#
197, fall [198, spring; not offered 1993.]
3 credits. Must be taken before declarying the major and is required for all department majors. NES 197 or 198 and any other Near Eastern studies course will constitute a sequence to fulfill the distribution requirement in either the social sciences or the humanities, depending on the second course used in combination with 197 or 198.
T R 1:25–2:40. R. Brann.
This course is designed to provide an introductory overview of Near Eastern society and culture from ancient to modern times for students with little or no previous training. Lectures will focus on four major periods of Near Eastern history: ancient, biblical, Islamic, and modern. In each historical period we will consider the development of major religious ideas, social and political institutions, economic structures, and literary forms. Readings will be chosen from primary sources in translation and modern secondary materials. In addition, movies, slides and other visual materials will be used as integral parts of the course.

NES 234 Muslims, Christians, and Jews in Islamic Spain: Literature and Society (also Comparative Literature 234, Jewish Studies 284, Near Eastern Studies 436, Religious Studies 234 and Spanish Literature 240) @#
Spring. 3 credits. This course can also be used to fulfill the requirements of the Medieval Studies Program.
T R 1:25–2:40. R. Brann.
Islamic Spain was a frontier society comprising six distinct ethnic-religious communities: Arabs, *muwalladun* (native Iberian converts to Islam), Berbers, *mustacribun* (Arabicized Christians), Jews and "Slavs" (European slave soldiers). This course will introduce students to the literature culture and society of al-Andalus (Islamic Spain) from the Ummayad emirate until the close of the Reconquista (711-1248). The development of Arabic and Hebrew poetry will be surveyed with focus on style, genres, and motifs. Conflicting theories of the origin and identity of Hispano-Arabic poetry and culture will also be considered.

NES 246 Seminar on Jewish Mysticism (also Jewish Studies 246 and Religious Studies 246) #
Fall. 3 credits. Limited to 15 students. This course can also be used to fulfill the requirements of the Medieval Studies Program.
M W F 10:10–11:00. S. Katz.
This course will deal with an intensive study of certain essential problems in the history of Jewish mysticism from the Rabbinic period to the early Middle Ages. Knowledge of Hebrew is not required.

NES 274 Jewish Civilization in Eastern Europe: 1789–1939 (also Jewish Studies 274)
Spring. 2 credits.
TBA. A. Nadler.
An introduction to the social, intellectual, and literary history of the Jews of Eastern Europe in the mrn period, as reflected in primary texts (in English translation). The course will explore the full range of Jewish religious, cultural, and political movements of this period, such as hasidism, the haskala (Jewish enlightenment), and the varieties of modern Jewish nationalism, through the prism of their greatest literary works.

NES 320 Topics in Religion: Religious Symbols in Near Eastern Late Antiquity (also Jewish Studies 340 and Religious Studies 340) @#
Spring. 4 credits.
T R 1:25–2:40. L. Kant.
Exploration of the meanings of religious images that are used as symbols. Close examination of selected examples in both texts and iconography from Christianity, Judaism, and pagan religions in the Graeco-Roman world: e.g., animals of all kinds, the good shepherd, menorah, torah ark, garland of victory, and portraits of the dead. Also considered will be figures and institutions that were often depicted inconographically or perceived in visual terms, such as Christ, the Jewish Temple, and various pagan deities and heroes. Attention will be given to modern methodological approaches (philosophical, historical, anthropological, psychological, and literary). Toward the conclusion, some comparison will be made with modern symbolic images that are religious or have religious overtones, such as creches, Christmas trees, menorahs, and the American flag.

NES 324 The History of Early Christianity (also Jewish Studies 344 and Religious Studies 325) #
Fall. 4 credits. This course can also be used to fulfill the requirements for the Medieval Studies Program.
T R 1:25–2:40. L. Kant.
History of Christianity in the Roman Empire from its beginnings in the New Testament period to the Council of Chalcedon (100–451 C.E.). Emphasizing primary sources (both textual and archaeological/iconographic), the course treats the socio-cultural changes in Christian communities, as well as developments in Christian orthodoxy over heretical movements (e.g., gnostics); role of Greek philosophy in shaping Christian thought; martyrdom and persecution; asceticism, monasticism, and holy persons; Christian views of political and social responsibility.

[NES 346 Jews of Arab Lands (also Jewish Studies 386) @#
Fall. 4 credits. Not offered 1992–93.]

NES 348 Varieties of Judaism in the Graeco-Roman World (also Jewish Studies 348 and Religious Studies 348) @#
Spring. 4 credits.
T R 11:40–12:55. L. Kant.
An investigation of the different forms of Judaism that existed in the context of Graeco-Roman culture from about the time of Alexander the Great (end of fourth century B.C.E.) through the formation of Rabbinic Judaism (third century C.E.). We will explore the tremendous diversity of ancient Judaism, while searching for those common elements that made an individual or group Jewish. Topics will be apocalyptic movements and literature; adaptation of Judaism to Greek and Roman culture; sects of Judaism—Sadducees, Pharisees, Essenes, Samaritans; the Qumran community; nationalism and anti-nationalism from the Maccabean revolt to the Jewish war (Maccabees and Hasidim, Zealots, Sicarii, Hellenists, pietists, and peace parties); synagogue as an alternative to Temple cult; diaspora Judaism from Anatolia to Egypt to Italy; Philo and Josephus; syncretism; Christianity as a Jewish sect; formation of rabbinic Judaism after the destruction of the Temple, including Mishnah and midrash. We will also pay attention to social, economic, and cultural diversity. We will use icono-

graphic and epigraphic evidence to illuminate various issues.

NES 351 Introduction to Islamic Law (also Religious Studies 350) @#
Spring. 4 credits. This course can also be used to fulfill the requirements for the Medieval Studies Program.
T R 2:55–4:10. D. Powers.
An examination of the historical development of Islamic law from its formative period to modern times, with special emphasis on the laws of personal status (marriage, divorce, and inheritance). Topics to be discussed will include the origins of Islamic law; the relationship between law and society; the nature and function of legal documents; the impact of colonialism on legal institutions; and the problems and challenges of legal reform.

[NES 352 Islam and the West @
Spring. 3 credits. Not offered 1992–93.]

[NES 357 Islamic Law and Society @#
Fall. 4 credits. Not offered 1992–93.]

NES 436 Muslim, Christians, and Jews in Islamic Spain: Literature and Society (also Comparative Literature 234, Jewish Studies 284, Near Eastern Studies 436, Religious Studies 234, and Spanish Literature 240)
Spring. 3 credits. This course can also be used to fulfill the requirements of the Medieval Studies Program.
T R 1:25–2:40. R. Brann.
For description see NES 234 under Near Eastern Studies, Civilization.

NES 453 Islam in South Asia (also History 417 and Religious Studies 417) @#
Fall. 4 credits.
F 2:30–4:25. R. Ahmed.
This course will examine the dominant features of South Asian Islam, including the nature of beliefs and practices, the rituals and institutions in their different local contexts. One of the major objects of this course is to demonstrate that Islam never functioned as a monolithic system in South Asia and developed its own traditions in different local contexts which did not necessarily conform to the orthodox interpretations by the ulema. It will conclude with a consideration of the major Islamic movements in South Asian Islam in more recent times.

NES 493 Problems of Ethnicity, Religion and Interest: Russia, Central Asia and the Middle East (also Government 439 and Religious Studies 493)
Fall. 4 credits.
T R 2:55–4:10.
The seminar will examine the impact of the breakup of the Soviet Union and the domestic issues affecting policies toward the Middle East from Turkey to the Persian Gulf. Particular attention will be given to the role of Islam and ethnicity in the newly independent Muslim states, as well as Russia, in the interplay between these factors and the economic, political, and defense interest of these states.

History

[NES 243 History and Archaeology of Ancient Israel (also Jewish Studies 264) @#
Spring. 4 credits. Not offered 1992–93.
For description see NES 243 under Near Eastern Archaeology.]

NES 248 Introduction to Classical Jewish History (also Jewish Studies 248) @#
Fall. 3 credits. Enrollment limited to 40 students.
M W F 1:25–2:15. S. Katz.
A survey of the major developments in Jewish history between the destruction of the first temple in 586 B.C.E. and the rise of Islam. Topics will include the return under Ezra and Nehemiah; the encounter with Hellenism; the Antiochene persecutions; the growth of Roman influence; the rebellion of 70 C.E.; the rise of such Jewish groups as the Sadducees, Pharisees, and Essenes; the conflict with early Christianity; and the nature of rabbinic Judaism.

NES 249 Introduction to Modern Jewish History (also Jewish Studies 259) #
Spring. 3 credits. Enrollment limited to 40 students.
M W F 10:10–11. S. Katz.
A survey of the major developments in Jewish history between the expulsion from Spain (1492) until 1900. Topics will include the growth of mysticism and Hasidism; the development of Eastern European Jewry; the impact of emancipation; the rise of Jewish pluralism, e.g., Reform Judaism, Conservative Judaism, Neo-Orthodoxy; the character of modern anti-Semitism; the origins and growth of American Jewry; and the beginnings of political Zionism.

[NES 257 Islamic History: 600–1258 (also History 254 and Religious Studies 257) @#
Spring. 3 credits. This course can also be used to fulfill the requirements for the Medieval Studies Program. Not offered 1992–93.]

NES 258 Islamic History, 1258–1850 (also History 248 and Religious Studies 258) @#
Fall. 3 credits.
T R 10:10–11:25. L. Peirce.
A survey of the social and political history of the Near East from the Mongol invasions to the beginning of European penetration. Topics include the tensions between establishment Islam (both Sunni and Shii) and mystical and fundamentalist currents; the impact of ethnic, class, and gender differences on social organization; and the role of slavery. In the political arena, we will focus on the nature of the stable states characteristic of the post-Mongol era (specifically, the Mamluk, Ottoman, and Safavid empires) and, particularly toward the end of the course, the interaction of the Near East with Europe. A question that will concern us throughout is whether we are justified in labeling the history of the near East in this period "Islamic" history.

[NES 259 The Ottoman Empire from 1300 to 1923 @#
Spring. 3 credits. Not offered 1992–93.]

[NES 261 Ancient Seafaring (also Archaeology 275) @
Not offered 1992–93.]

[NES 264 Agriculture and Society in the Ancient Near East @#
Spring. 3 credits. Not offered 1992–93.]

[NES 277 Seminar in Jewish History (also Jewish Studies 242)
Spring. 3 credits. Not offered 1992–93.]

[NES 294 Modern History of the Middle East: Changing Politics, Society, and Ideas (also Government 358) @
Fall. 4 credits. Fulfills the college distribution requirement in history or the social sciences. Not offered 1992–93.]

[NES 351 Introduction to Islamic Law (also Religious Studies 350) @#
Spring. 4 credits. D. Powers. Not offered 1992–93.
For description see NES 351 under Near Eastern Civilization.]

[NES 352 Islam and the West @
Spring. 3 credits. Not offered 1992–93.]

[NES 355 Islam and Politics @
Spring. 4 credits. Not offered 1992–93.]

[NES 358 The Islamic Resurgence @
Spring. 4 credits. Prerequisite: NES 258 or NES 294. Not offered 1992–93.]

[NES 361 Interconnections in the Eastern Mediterranean World in Antiquity @#
Fall. 4 credits. Not offered 1992–93.]

[NES 362 The History and Archaeology of Ebla @#
Not offered 1992–93.]

[NES 365 The Divided Monarchy (also Jewish Studies 365) @#
Not offered 1992–93.]

[NES 366 Archaeology of the Ancient Near East (also Archaeology 310) @#
Fall. 4 credits. Not offered 1992–93.]

NES 367 The History and Archaeology of Ancient Egypt @#
Fall. 4 credits. Not offered 1992–93.]

NES 395 International Relations of the Middle East (also Government 392) @
Spring. 4 credits.
T 1:25–4:25. S. Telhami.

[NES 397 Topics in the Middle East (also Government 352) @
Spring. 4 credits. Not offered 1992–93.]

[NES 418 Seminar in Islamic History: Muhammad and the Rise of Islam (also History 460, Near Eastern Studies 618, and Religious Studies 418/618) @#
Spring. 4 credits. Not offered 1992–93.]

NES 453 Islam in South Asia (also History 417 and Religious Studies 417) @#
Fall. 4 credits.
F 2:30–4:25. R. Ahmed.
For description see NES 453 under Near Eastern Civilization.

NES 463 The Material Culture of a Syrian City State in the Third Millennium B.C.E. (also Society for the Humanities 405)
Fall. 3 credits.
L. Milano.
For description see NES 463 under Near Eastern Archaeology.

[NES 618 Seminar in Islamic History: Muhammad and the Rise of Islam (also History 660, Near Eastern Studies 418, and Religious Studies 418/618)
Spring. 4 credits. Not offered 1992–93. For description, see NES 418 under Near Eastern History.]

[NES 682 International Relations of the Middle East (also Government 682)
Spring. 4 credits. Not offered 1992–93]

Literature

[NES 220 The New Testament (also Classics 202 and Religious Studies 202) #
Spring. 3 credits. Prerequisite: at least one year of ancient Greek (Classics 101–103 or permission of instructor). Not offered 1992–93.]

NES 223 Introduction to the Bible (also Jewish Studies 223 and Religious Studies 223) @#
Fall. 3 credits.
M W F 1:25–2:15. G. Rendsburg.
This course will survey the main historical, religious, and literary issues raised by a close textual reading of the Hebrew Bible (from Genesis to Deuteronomy). It will be concerned with both situating the Bible in its ancient Near Eastern context as well as with discerning its meaning for contemporary reality. All readings will be in English translation.

[NES 224 Wisdom Literature: An Introduction @#
Spring. 3 credits. Not offered 1992–93.]

[NES 226 Exodus and Conquest @#
Spring. 3 credits. Not offered 1992–93.]

[NES 227 Introduction to the Prophets (also Jewish Studies 227 and Religious Studies 227) @#
Spring. 3 credits. Not offered 1992–93.]

NES 228 Genesis (also Near Eastern Studies 628, Jewish Studies 228 and Religious Studies 228) @#
Spring. 3 credits.
T R 10:10–11:25. G. Rendsburg.
An in-depth study of the biblical *Book of Genesis* within its ancient Near Eastern setting. Particular attention will be paid to literary, historical, cultural, and theological concerns. Concentration on the patriarchal narratives and the story of Joseph.

[NES 229 Introduction to New Testament (also Religious Studies 229) #
Spring. 3 credits. Not offered 1992–93.]

[NES 231 Classics of Hebrew Literature: A Survey of the Hebrew Literary Tradition (also Comparative Literature 231 and Jewish Studies 231)
Fall. 3 credits. Not offered 1992–93.]

[NES 233 The Lyrics of Love and Death: Medieval Hebrew Poetry in Translation (also Comparative Literature 333 and Jewish Studies 233) @#
Spring. 3 credits. This course can also be used to fulfill the requirements of the Medieval Studies Program. Not offered 1992–93.]

NES 234 Muslims, Christians, and Jews in Islamic Spain: Literature and Society (also Comparative Literature 234, Jewish Studies 284, Near Eastern Studies 436, Religious Studies 234, and Spanish Literature 240) @#
Spring. 3 credits. This course can also be used to fulfill the requirements of the Medieval Studies Program.
For description, see NES 234 under Near Eastern Civilization.

[NES 236 Israel: Literature and Society @
Spring. 3 credits. Not offered 1992–93.]

[NES 279 Jewish Sectarian Literature in Late Antiquity (also Jewish Studies 249 and Religious Studies 279) @#
Spring. 3 credits. Not offered 1992–93.]

[NES 322 Undergraduate Seminar in Biblical Literature: Prophecy in Ancient Israel @#
Spring. 4 credits. Not offered 1992–93.]

[NES 332 Ancient Near Eastern Literature @#
Spring. 4 credits. Not offered 1992–93.]

NES 383 Readings in Modern Turkish Culture and Society
Fall. 4 credits. Prerequisite: NES 217–218 or permission of instructor.
T R 1:25–2:40. L. Peirce.
Using selected texts, we will examine some of the major issues in the culture and society of modern Turkey. Topics include the role of Islam, the effects of the rapid urbanization of recent decades, and gender relations.

[NES 402 Seminar in Hebrew Literature and Poetics (also Jewish Studies 402) @#
Spring. 4 credits. Prerequisites: NES 301 or equivalent and permission of instructor. Not offered 1992–93.]

[NES 411 Readings in Classical Arabic Texts @#
Fall. 4 credits. This course can also be used to fulfill the requirements of the Medieval Studies Program. Not offered 1992–93.]

NES 420 Readings in the Hebrew Bible (also Jewish Studies 420 and Regligious Studies 420) @#
Fall. 4 credits. Prerequisite: one year of Hebrew, biblical or modern. Course may be repeated for credit.
M W F 10:10–11. G. Rendsburg.
Advanced course in reading selected portions of the Hebrew Bible. Emphasis will be placed on the philological method, with attention to literary, historical, and comparative concerns as well.

NES 421 Readings in Biblical Hebrew Poetry (also Jewish Studies 421 and Religious Studies 423) @#
Spring. 4 credits. Prerequisite for NES 421: one year of Biblical or Modern Hebrew. Course may be repeated for credit.
T R 2:55–4:10. G. Rendsburg.
Advanced course in reading selected poems of the Hebrew Bible. Chapters to be studied include various Psalms, parts of the Book of Job, various prophetic speeches, and early compositions such as Genesis 49 and Judges 5. Emphasis will be placed on the philological method, with attention to literary, historical, and comparative concerns as well.

[NES 428 Medieval Biblical Hebrew Exegesis (also Jewish Studies 488 and Religious Studies) @#
Spring. 4 credits. Prerequisite: Advanced knowledge of Hebrew or permission of instructor. Not offered 1992–93.]

NES 429 Readings in the New Testament (also Comparative Literature 429, English 429, and Religious Studies 429) #
Fall. 4 credits. Enrollment limited to 8 NES students; 9 Comparative Literature students; and 8 Religious Studies students.
M W F 12:20–1:10. J. P. Bishop.
Close readings of representative texts from the New Testament in modern scholarly editions, with the help of appropriate commentary, introductory and specialized. The focus for 1992 will be on Acts and the letters of Paul. All readings will be in English, but repeated reference to the Greek original will be made. Graduate students and undergraduates from other colleges who are interested in the materials should not feel inhibited from enrolling. The approach will be primarily exegetical; that is, we will try to find out what the texts say and what they mean by what they say. Thus we can hope to stay open to scholarly and religious issues alike.

[NES 432 Readings in Judeo-Arabic: Medieval Judeo Arabic and Hebrew Poetics (also Jewish Studies 482)
Spring. 4 credits. Prerequisite: Arabic 212, Hebrew 202, or equivalents. Designed for graduate students but open to undergraduates with permission of instructor. Entire sequence may be repeated for credit; readings will vary from year to year. Not offered 1992–93.]

NES 491–492 Independent Study, Undergraduate Level
Fall and/or spring. Variable credit. Prerequisite: permission of instructor.
Staff.

NES 499 Independent Study, Honors
Fall and spring. Variable credit. Prerequisite: permission of instructor.
Staff.

[NES 627 The Song of Songs (also Religious Studies 627 and Jewish Studies 627)
Fall. 4 credits. Prerequisite: graduate level or permission of instructor. Not offered 1992–93.]

[NES 628 Genesis (also NES 228 and Jewish Studies 628)
Fall. 4 credits. Not offered 1992–93.]

NES 633–634 Elementary Akkadian I and II (also Near Eastern Studies 333–334)
Fall, 633; spring, 634. 4 credits.
D. I. Owen.
For description see NES 333–336 under Near Eastern Languages.

NES [635]–636 Readings in Akkadian Texts (also NES 336)
Spring, 636. 635 not offered 1992–93. 4 credits. Prerequisite for 636: 633–634. Prerequisite for 336: 333–334.
For description see NES 335–336 under Near Eastern Languages.

NES 691–692 Independent Study, Graduate Level
Fall or spring. Variable credit. Prerequisite: permission of instructor.
Staff.

The Program of Jewish Studies

Please see Program of Jewish studies under "Special Programs and Interdisciplinary Studies" for complete descriptions of the following courses.

JWST 101–102 An Introduction to Jewish Classics (also Near Eastern Studies 121–122 and Religious Studies 121–122)
101, fall; 102, spring. 3 credits each semester.
M W F 1:25–2:15. Staff.

[JWST 250 Response to the Holocaust
Spring. 2 credits. Not offered 1992–93.]

[JWST 251 The Holocaust: The Destruction of European Jewry, 1933–1945
Spring. 3 credits. Not offered 1992–93.]

[JWST 254 Jurisprudence and the Holocaust
Fall. 2 credits. Not offered 1992–93.]

[JWST 257 Seminar: The Eichmann Case
Spring. 2 credits. Prerequisites: 241 and/or 244 or permission of instructor. Enrollment limited to 20 students. Not offered 1992–93.]

JWST 274 Jewish Civilization in Eastern Europe: 1814–1939 (also Jewish Studies 274)
Spring. 2 credits.
TBA. A. Nadler.

JWST 351 Jewish Workers in Europe and America (also Industrial and Labor Relations Collective Bargaining 381)
Spring. 4 credits.
T 1:25–4:25. G. Korman.

JWST 352 The Holocaust in Historical Context: A Seminar
Spring. 4 credits. Enrollment limited to 15 students (juniors and seniors only).
M W F 10:10–11. S. Katz.
This seminar will center on certain of the main historical and ideological elements that arise in response to the destruction of European Jewry between 1933 and 1945. Beginning with the background of classical and modern European anti-semitism, and the failure of the Weimar Republic, we will move on to analyze in detail such topics as the Nazi program of disemancipation, the meaning of W.W. II for the "Jewish Question," the nature of the process of ghettoization, the role of technology and bureaucracy in the "Final Solution," and the character of the death camps. We shall also consider the role of the allies, the churches, and other onlookers and bystanders.

JWST 414 History into Fiction: Nazis and the Literary Imagination (also Comparative Literature 404 and English 404)
Fall. 4 credits.
T R 11:40–12:55. E. Rosenberg. Enrollment limited to 5 JWST students.

NES 450 Undergraduate Seminar in Recent American History: Benjamin N. Cardozo and the American Judicial Tradition (also History 440)
Fall. 4 credits. Permission of instructor requied.
T R 11:40–12:55. R. Polenberg.

Related Courses in Other Departments

Archaeology
Classics
Comparative Literature
Economics
German Studies
Government
English
History
History of Art
Industrial and Labor Relations Collective Bargaining
Medieval Studies
Modern Lanaguages and Linguistics
Philosophy
Religious Studies
Romance Studies
Society for the Humanities
Sociology
Women's Studies

NEPALI

See Department of Modern Languages and Linguistics.

PHILOSOPHY

N. L. Sturgeon, chair; R. N. Boyd, M. D. Crimmins, G. Fine, C. A. Ginet, H. Hodes, T. H. Irwin, J. Jarrett, N. Kretzmann, D. Lyons, R. W. Miller, S. Shoemaker, A. W. Wood

The study of philosophy provides students with an opportunity to become familiar with some of the ideas and texts in the history of thought while developing analytical skills that are valuable in practical as well as academic affairs. It affords the excitement and satisfaction that come from understanding and working toward solutions of intellectual problems. The curriculum includes offerings in the history of philosophy, logic, philosophy of science, ethics, social and political philosophy, metaphysics, and theory of knowledge. Any philosophy course numbered in the 100s or 200s is suitable for beginning study in the field. Sections of Philosophy 100 are part of the freshman writing seminar program; they are taught by various members of the staff on a variety of philosophical topics, and because of their small size (seventeen students at most) they provide ample opportunity for discussion. Students who want a broad introduction to philosophy may take Philosophy 101, but many students with special interests may find that the best introduction to philosophy is a 200-level course in some particular area of philosophy; such courses have no prerequisites and are usually open to freshmen.

The Major

Students expecting to major in philosophy should begin their study of it in their freshman or sophomore year. Admission to the major is granted by the director of undergraduate studies of the department on the basis of a student's work during the first two years. Normally the student must have completed two philosophy courses with grades of B or better. Eight philosophy courses are required for the major. They must include at least one course in ancient philosophy (Philosophy 210 or 211, or a course with a large component on Plato or Aristotle), at least one course in classical modern metaphysics and epistemology. (Philosophy 212 or a course on the empiricists, the rationalists, or Kant), and a minimum of three courses numbered above 300. A course in formal logic (e.g., Philosophy 231), while not required, is especially recommended for majors or prospective majors.

Philosophy majors must also complete at least 8 credits of course work in related subjects approved by their major advisers. Occasionally majors may serve as teaching or research aides, working with faculty members familiar with their work.

Honors. A candidate for honors in philosophy must be a philosophy major with an average of B- or better for all work in the College of Arts and Sciences and an average of B+ or better for all work in philosophy. In either or both terms of the senior year a candidate for honors enrolls in Philosophy 490 and undertakes research leading to the writing of an honors essay by the end of the final term. Honors students normally need to take Philosophy 490 both terms of their senior year in order to write a satisfactory honors essay. Philosophy 490 does *not* count toward the eight philosophy courses required for the major. Prospective candidates should apply at the philosophy department office, 218 Goldwin Smith Hall.

Fees

In some courses there may be a small fee for photocopying materials to be handed out to students.

Introductory Courses

These courses have no prerequisites; all are open to freshmen.

PHIL 100 Freshman Writing Seminars in Philosophy
Fall and spring. 3 credits. Consult the brochure listing freshman writing seminars prepared by the John Knight Writing Program.

PHIL 101 Introduction to Philosophy (by petition for breadth requirement)
Fall and spring. 3 credits. Normally offered in the six-week summer session.
Fall: M W F 9:05. N. Sturgeon.
This course will deal with a number of the central problems of philosophy, such as the existence of God, our knowledge of the external world, the mind-body problem, free will and the foundations of morality. Discussion sections to be scheduled.
Spring: M W F 1:25. G. Fine.
This course will deal with a number of the central problems of philosophy, such as the existence of God, our knowledge of the external world, the mind-body problem, free will and the foundations of morality.

PHIL 201 Philosophical Problems
M W F 9:05. C. Ginet.
This course will discuss the following well-known puzzles: Zeno's paradoxes of motion (the Racecourse, the Arrow, the Stadium) and of plurality, the paradox of the heap, the paradox of the surprise examination, the prisoners' dilemma, Newcomb's problem, and the paradox of the liar. These puzzles present us with reasoning that is paradoxical in the sense that, although it seems clear that there must be something wrong with the reasoning, it is not easy to see what it is. Studying such puzzles is not only an intriguing exercise in itself but it can show us interesting things

about such basic concepts as those of space, time, motion, truth, knowledge, rational choice, and causation.

[PHIL 210 Ancient Thought #
4 credits. Not offered 1992–93.]

PHIL 211 Ancient Philosophy #
Fall. 4 credits. Normally offered in the six-week summer session. No prerequisites.
T R 1:25–2:40. G. Fine.
This course explores the origins of Western philosophy, as it emerged in Ancient Greece and Rome. We will explore some of the central ideas of the presocratics, Socrates, Plato, Aristotle, and the post-Aristotelians (Epicureans, Stoics, and Sceptics). Questions to be considered include: what are the nature and limits of knowledge? How reliable is perception? What are the basic entities in the universe? Atoms? Platonic Forms? Aristotelian substances? Is moral knowledge possible? Why be moral? What is the nature of happiness and what sort of life will make people happy? Do human beings have free will?

PHIL 212 Modern Philosophy #
Spring. 4 credits.
M W F 10:10–11:15. S. Shoemaker.
A survey of major philosophical problems in metaphysics and the theory of knowledge in seventeenth- and eighteenth-century European philosophy. Readings from Descartes, Spinoza, Locke, Leibniz, Berkeley, Hume, and Kant.

PHIL 213 Existentialism
Fall. 4 credits.
T R 2:55–4:10. A. Wood.
A study of selected writings, literary as well as philosophical, of four major existentialist thinkers in the nineteenth and twentieth centuries: Kierkegaard, Dostoyevsky, Nietzsche, and Sartre.

[PHIL 214 Philosophical Issues in Christian Thought #
4 credits. Not offered 1992–93.]

PHIL 231 Introduction to Formal Logic
4 credits. Normally offered in the six-week summer session.
Fall: M W F 11:15, J. Jarrett. Spring: M W F 9:05, C. Ginet.
Analysis and evaluation of deductive reasoning in terms of formalized languages. The logic of sentences, predicates, and quantifiers. (This course, rather than Philosophy 331, is the recommended introductory formal logic course.)

PHIL 241 Ethics (by petition for breadth requirement)
Spring. 4 credits.
M W F 1:25. T. Irwin.
Introduction to the philosophical study of major moral questions—for example: Are all values relative, or are there some objective moral values? Have we ever any good reason to care about the interests of other people? Do people have rights with which governments should not interfere, even to advance the general welfare? What inequalities are unjust? The course discusses general issues in moral philosophy, together with some of their implications for particular current moral controversies, such as the debates over abortion, reverse discrimination, and policies reducing economic inequality. Readings from major philosophers of the past, as well as contemporary sources.

[PHIL 242 Social and Political Theory (by petition for breadth requirement)
4 credits. Not offered 1992–93.]

[PHIL 243 Aesthetics
Fall. 4 credits. Not offered 1992–93.]

[PHIL 244 Philosophy and Literature
4 credits. Not offered 1992–93.]

PHIL 245 Ethics and Health Care (also Biology and Society 205 and Biological Sciences 205)
Fall. 4 credits. Normally offered in the six-week summer session. Limited to 80 students. (40 under philosophy, 15 under Biology and Society, and 25 under Biological Sciences). Registered students not attending the first week will be dropped from the course. Open to sophomores, juniors, and seniors; permission of instructor required for graduate students.
Lecs, T R 8:40–9:55; disc, 1 hour each week to be arranged. D. Allchin.
Critical *philosophical* analysis of the conceptual frameworks in which ethical problems associated with health care can be formulated and solutions evaluated. General topics (with sample issues indicated in parentheses) include knowledge in ethics (ethical scepticism, ethical relativism); proper social allocation of resources for, and within, medicine (entitlement to health care, access to scarce medical resources, cost-benefit analysis); the proper account of basic concepts such as illness, death, autonomy, and personhood (abortion, euthanasia, procreative technologies); and the professional-patient relationship (informed consent, confidentiality, medical paternalism). Note: a more detailed description of this course is available in the philosophy department office.

PHIL 246 Ethics and the Environment (also Biology and Society 206 and Biological Sciences 206)
Spring. 4 credits. Open to all undergraduates. Permission of instructor required for graduate students.
Lecs, T R 12:20–1:10; disc, 1 hour each week to be arranged. D. Allchin.
Critical *philosophical* analysis of the conceptual frameworks in which policies affecting the environment are formulated and judged. An introductory section of the course discusses the nature of ethics and the possibility of knowledge in ethics. The first major substantive component of the course deals with the nature and extent of individual and social obligations to spatially distant people, future generations, nonhuman animals, and nonsentient things (e.g., the ecosystem). The second major component of the course deals with the appropriate analysis of the origin of environmental problems and the range of options for their solution. Topics include individual vs. collective goods, cost-benefit analysis, and coordination problems. Note: a more detailed description of the course is available in the philosophy department office.

PHIL 247 Ethics and Public Life
Spring. 4 credits.
T R 10:10–11:25. H. Shue.
An examination of the relative strength of human responsibilities at three levels: toward intimates, toward compatriots, and toward strangers. At the level of intimates the focus is on feminist critiques of relationships within the conventional family and of gendered roles more generally: how should men and women relate to each other? Attention in the national arena is on contemporary debates about the basis and scope of the welfare state: how should the well-fed and well-housed deal with fellow citizens who are hungry or homeless? Relationships toward strangers are examined at the international level in the case of distant famines: do the well-fed and well-housed of one nation have responsibilities toward the hungry and homeless of other nations? At all three levels, emphasis is on the meaning and implications of belief in human equality.

[PHIL 261 Knowledge and Reality
4 credits. Not offered 1992–93.]

PHIL 262 Philosophy of Mind
Fall. 4 credits.
T R 10:10–11:25. S. Shoemaker.
A study of philosophical issues concerning the place of mind in the physical world, including the mind-body problem (are thoughts and experiences physical entities?), the problem of knowledge of other minds (how can we know that others have minds and are not mere automata?), the nature of consciousness, the intentionality (or 'aboutness') of mental representations, and the possibility of artificial intelligence. Readings from classic and contemporary sources.

[PHIL 263 Religion and Reason
4 credits. Not offered 1992–93.]

PHIL 286 Science and Human Nature
Spring. 4 credits.
M W F 11:15. R. N. Boyd, N. L. Sturgeon.
An examination of attempts in the biological and social sciences to offer scientific theories of human nature and human potential and to apply such theories to explain important social and psychological phenomena. Topic for 1992: Darwin, social Darwinism, and human sociobiology.

Intermediate or Advanced Courses

Some of these courses have prerequisites.

[PHIL 309 Plato #
Fall. Not offered 1992–93.]

PHIL 310 Aristotle #
Spring. 4 credits.
T R 2:55–4:10. T. Irwin.
Aristotle's main doctrines and the problems they raise for a contemporary philosopher. Language and reality; scientific method and the structure of scientific knowledge; matter, form, and substance; essence and accident; philosophy of nature and the understanding of living organisms; mechanism and purpose; time and change; soul and body.

PHIL 311 Modern Rationalism #
Spring. 4 credits.
T R 1:25–2:40. G. Fine.
A systematic study of Descartes, Spinoza, and Leibniz (though more attention will be paid to Descartes than to Spinoza, and to Spinoza than to Leibniz). Topics for the course will include substance; necessity and possibility; causation; free will and determinism; proofs for the existence of God; innate ideas; and skepticism and the limits of knowledge. Prerequisites: at least two previous courses in philosophy, of which at least one must have been at the 200-level or above.

[PHIL 312 Modern Empiricism #
4 credits. Not offered 1992–93.]

[PHIL 314 Topics in Ancient Philosophy #
4 credits. Not offered 1992–93.]

[PHIL 315 Medieval Philosophy #
4 credits. Not offered 1992–93.]

PHIL 316 Kant #
Fall. 4 credits.
T R 10:10. A. Wood.
Introduction to Kant's main doctrines in metaphysics, theory of knowledge, and ethics. Topics include the possibility of nonempirical knowledge, the nature of space and time and our knowledge of them, proof of the existence of an objective world, why events must have causes, determinism and the possibility of free will, and the basis of morality.

[PHIL 317 Hegel #
4 credits. Not offered 1992–93.]

[PHIL 318 Twentieth-Century Philosophy
4 credits. Not offered 1992–93.]

[PHIL 319 Philosophy of Marx #
4 credits. Not offered 1992–93.]

PHIL 331 Formal Logic
Spring. 4 credits. Prerequisite: Philosophy 231 or equivalent or permission of the instructor.
M W F 2:30. H. Hodes.
Review of derivations and other material covered in 231; basic set-theoretic concepts; truth in a model and the semantic definitions of consequence, validity, equivalence, and other logic concepts; and the soundness and completeness of a natural-deduction formalization of elementary logic. Further topics will be covered if time permits.

[PHIL 332 Philosophy of Language
4 credits. Not offered 1992–93.]

[PHIL 341 Ethical Theory
4 credits. Not offered 1992–93.]

[PHIL 342 Law, Society, and Morality (also Law 666)
Fall. Not offered 1992–93.]

PHIL 343 Political Obligation and Civil Disobedience
Fall. 4 credits.
M W F 9:05. D. Lyons.
An examination of the idea that there is a moral obligation to obey the law and of the idea that conscientious disobedience to law can be justified.

[PHIL 344 History of Ethics—Ancient and Medieval #
Not offered 1992–93.]

[PHIL 345 History of Ethics—Modern #
Not offered 1992–93.]

[PHIL 346 Modern Political Philosophy
Fall. Not offered 1992–93.]

PHIL 361 Metaphysics and Epistemology
Spring. 4 credits.
M W F 2:30. S. Shoemaker.
An investigation of the metaphysical and epistemological status of "secondary qualities," with special attention to the nature of color and color experience. The first part of the course will examine the seventeenth-century background of the issue, with readings from Descartes, Galileo, Boyle, Locke, and Newton. The remainder of the course will examine recent discussions of the nature of color.

[PHIL 363 Topics in the Philosophy of Religion
4 credits. Not offered 1992–93.]

PHIL 368 Global Climate and Global Justice (also Government 368)
T R 2:55–4:10. H. Shue.
Attempts to organize international cooperation to prevent fundamental changes in global climate, like ozone destruction and global warming, have produced disputes between rich states and poor states about who should bear which proportion of the costs of the necessary economic changes. What is fair when rich and poor cooperate to deal with a common threat? This course critically examines liberal, communitarian, feminist, and Third-World views.

[PHIL 369 Limiting War: The Morality of Modern State Violence (also Government 469)
4 credits. Not offered 1992–93.]

PHIL 381 Philosophy of Science: Knowledge and Objectivity
Fall. 4 credits.
M 7:30–10 p.m. Sections: R 10:10–11:25, 1:25–2:40. R. Boyd.
An examination of central epistemological and metaphysical issues raised by scientific theorizing: the nature of evidence; scientific objectivity; the nature of theories, models, and paradigms; and the character of scientific revolutions. In addition to the contemporary literature in the philosophy of science, readings are also drawn from the history of science and from the works of classical modern philosophers such as Locke, Hume, and Descartes. Note: lecture and *one required section.*

[PHIL 382 Philosophy and Psychology
4 credits. Not offered 1992–93.]

PHIL 384 Philosophy of Physics
Fall. 4 credits.
M W F 1:25. J. Jarrett.
An introduction to issues arising in a philosophical examination of modern physical science. Relevant aspects of classical statistical mechanics, relativity theory, and quantum mechanics will be considered in connection with such topics as microphysical indeterminateness, probabilistic laws, causality, the direction of time, action-at-a-distance, and scientific explanation.

[PHIL 388 Social Theory
4 credits. Not offered 1992–93.]

[PHIL 389 Philosophy of Science: Evidence and Explanation
4 credits. Not offered 1992–93.]

PHIL 390 Informal Study
Fall or spring. Credit to be arranged.
Staff.
To be taken only in exceptional circumstances. Must be arranged by the student with his or her adviser and the faculty member who has agreed to direct the study.

Advanced Courses and Seminars

These courses are offered primarily for majors and graduate students.

[PHIL 395 Majors Seminar
4 credits. Not offered 1992–93.]

PHIL 409 German Philosophical Texts
Fall and spring. Variable credit.
A. Wood. Prerequisites: knowledge of German and permission of instructor.
Reading and translating German philosophical texts.

PHIL 410 Latin Philosophical Texts #
Variable credit. Fall and spring. Prerequisites: knowledge of Latin and permission of instructor.
Hours to be arranged. T. Irwin.
Reading of philosophical texts in the original Latin.

PHIL 411 Greek Philosophical Texts (also Classics 311) #
Fall and spring. Variable credit. Prerequisites: knowledge of Greek and permission of instructor.
Hours to be arranged. T. Irwin.
Reading of philosophical texts in the original Greek.

[PHIL 412 Medieval Philosophy #
4 credits. Not offered 1992–93.]

[PHIL 413 Topics in Ancient Philosophy #
4 credits. Not offered 1992–93.]

PHIL 414 German Philosophy after Kant #
Fall. 4 credits.
T R 11:40–12:55. A. Wood.
Topic for 1992–93: the origins of German philosophical radicalism in Fichte, Hegel, and Marx.

[PHIL 415 Special Topics in the History of Philosophy #
Fall. Not offered 1992–93.]

[PHIL 416 Modern Philosophy #
4 credits. Not offered 1992–93.]

[PHIL 431 Deductive Logic (also Mathematics 481)
4 credits. Not offered 1992–93.]

[PHIL 433 Philosophy of Logic
4 credits. Not offered 1992–93.]

[PHIL 436 Intensional Logic (also Mathematics 483)
4 credits. Not offered 1992–93.]

PHIL 437 Topics in the Philosophy of Language
Spring. 4 credits.
T R 11:40–12:55. M. Crimmins.
Topic for 1992–93 (tentative): Semantics and Pragmatics—ways of drawing the distinction, and phenomena at or near the boundary, perhaps including indexicality, ambiguity, ellipsis, tacit parameters, implicature, and presupposition. Previous exposure to logic and the philosophy of language or semantics is desirable (e.g., Philosophy 231 and 332).

PHIL 441 Contemporary Ethical Theory
Fall. 4 credits.
M W F 11:15. N. Sturgeon.
Topic for 1992-93: Moral Realism and Its Critics

[PHIL 442 Ethics and the Philosophy of Mind
4 credits. Not offered 1992–93.]

[PHIL 443 Topics in Aesthetics
4 credits. Not offered 1992–93.]

[PHIL 444 Contemporary Legal Theory (also Law 710)
4 credits. Not offered 1992–93.]

[PHIL 446 Topics in Social and Political Philosophy
4 credits. Not offered 1992–93.]

[PHIL 461 Metaphysics
Spring. 4 credits. Not offered 1992–93.]

[PHIL 481 Problems in the Philosophy of Science
4 credits. Not offered 1992–93.]

[PHIL 483 Philosophy of Choice and Decision
4 credits. Not offered 1992–93.]

PHIL 490 Special Studies in Philosophy
Fall or spring. 4 credits. Open only to honors students in their senior year.
Staff.

PHIL 611 Ancient Philosophy #
Fall. 4 credits.
Fall: M 4:30–6:30. G. Fine.
Topics to be announced.

[PHIL 612 Medieval Philosophy #
4 credits. Not offered 1992–93.]

[PHIL 613 Modern Philosophers #
4 credits. Not offered 1992–93.]

PHIL 619 History of Philosophy #
Fall. 4 credits.
W 4:30–6:30. T. Irwin.
Topic for 1992–93: Theories of the Will and Ethical Theory. Different conceptions of the will are relevant to questions about (1) the role of reason and desire in motivation; (2) freedom and responsibility; (3) the role of reason and sentiment in the foundations of ethics. Some of these questions will be explored through readings from ancient, medieval, and modern sources, especially Aristotle, the Stoics, Aquinas, Scotus, Hobbes, Reid, Hume, and Kant.

[PHIL 633 Philosophy of Language (also Linguistics 700)
4 credits. Not offered 1992–93.]

[PHIL 641 Ethics and Value Theory
4 credits.
Not offered 1992–93.]

PHIL 661 Theory of Knowledge (also S&TS 661)
Spring. 4 credits.
W 4:30–6:30. R. Miller.
Topic for 1992–93: Recent work (including Hilary Putnam's) on truth, rationality, and objectivity. We will look at some leading current discussions of what makes a belief rational, what determines its content, what is involved in asserting its truth, and the implications of each of these questions for our access to mind-independent facts. (Open to advanced undergraduates.)

[PHIL 662 Philosophy of Mind/The Emotions
4 credits. Not offered 1992–93.]

[PHIL 663 Philosophy of Religion
4 credits. Not offered 1992–93.]

[PHIL 664 Metaphysics
4 credits. Not offered 1992–93.]

PHIL 665 Metaphysics
Spring. 4 credits.
R 4:30–6:30. C. Ginet.
Topic: Free will and responsibility.

PHIL 681 Philosophy of Science
Spring. 4 credits.
R 4:30–6:30. R. Boyd.
Topic: to be announced.

[PHIL 682 Philosophy of Social Science
4 credits. Not offered 1992–93.]

PHIL 700 Informal Study
Fall or spring. Credit to be arranged.
Staff.
To be taken by graduate students only in exceptional circumstances and by arrangement made by the student with his or her Special Committee and the faculty member who has agreed to direct the study.

PHIL 773 Proseminar in Cognitive Studies (also Cognitive Studies 773, Linguistics 773, and Computer Science 773)
Fall. 2 credits.
See course description under PHIL 774.

PHIL 774 Proseminar in Cognitive Studies (also Cognitive Studies 774, Linguistics 774, and Computer Science 774)
Spring. 2 credits.
R 1:25–2:40. Staff (taught from Cornell's Cognitive Studies Program, representing the fields of computer science, linguistics, psychology, and philosophy).
This is a year-long lecture-and-discussion course that is intended to provide graduate students with an interdisciplinary introduction to the study of knowledge, its representation, acquisition, and use. Topics may include the psychology of perception and cognition; the philosophy of mind, language, and knowledge; the phonology, syntax, and semantics of natural language; computational approaches to natural language processing, vision and reasoning; parrallel distributed processing, and neuropsychology.

PHYSICS

K. Gottfried, chair (109 Clark Hall, 255-6016);
R. S. Galik, director of undergraduate studies ;
J. P. Alexander, V. Ambegaokar,
N. W. Ashcroft, K. Berkelman, E. Bodenschatz,
D. G. Cassel, G. V. Chester, B. Cooper,
R. M. Cotts, P. Drell, V. Elser, D. B. Fitchen,
C. P. Franck, B. Gittelman, B. Greene,
L. N. Hand, D. L. Hartill, C. L. Henley, W. Ho,
D. F. Holcomb, M. P. Kalos, T. Kinoshita,
A. LeClair, D. M. Lee, G. P. Lepage,
R. M. Littauer, N. D. Mermin, N. Mistry,
J. Orear, J. M. Parpia, R. O. Pohl, J. D. Reppy,
R. C. Richardson, D. L. Rubin, E. E. Salpeter,
J. P. Sethna, S. L. Shapiro, R. H. Siemann,
A. J. Sievers, E. Siggia, R. H. Silsbee,
P. C. Stein, R. M. Talman, M. P. Teter,
S. A. Teukolsky, R. Thorne, M. Tigner, H. Tye,
T-M. Yan, D. R. Yennie

The Department of Physics offers a full range of university-level work in physics, from general education courses for nonscientists to Ph.D.-level independent research. Major research facilities are operated by two component organizations, the Laboratory of Atomic and Solid State Physics (LASSP) and the Laboratory of Nuclear Studies (LNS). LASSP carries out extensive research efforts in condensed-matter physics and in low-temperature physics. LNS operates a major high-energy particle physics research facility at Wilson Laboratory, the Cornell electron-positron storage ring, called CESR. Theoretical work is carried out in many fields of physics, including astrophysics. There is a full schedule of weekly research-oriented seminars and colloquia. Junior and senior students will find many opportunities for research participation and summer jobs.

Three introductory physics sequences are open to freshmen: 101–102, 112–213–214–315, and 207–208. In addition, there is a cluster of general-education courses, Physics 201 through 206, 209, 210. Physics 101–102, a self-paced autotutorial course, is designed for students who do not intend to take further physics courses and who do not have preparation in calculus. Physics 112 and 207 both require calculus (Mathematics 191 or 111), and additional mathematics is required for subsequent courses in sequence. Physics 101–102 or 207–208 may be taken as terminal physics courses. The three- (or four-) term sequence 112–213–214–(315) or its honors version, 116–217–218–(315), is recommended for engineers and physics majors.

Courses beyond the introductory level that might be of interest to nonmajors include. Physics 315, Phenomena of Microphysics; Physics 330, Modern Experimental Optics; and Physics 360, Electronic Circuits.

Advanced placement and credit are offered as outlined in "Advanced Placement of Freshmen," or students may consult Professor Cotts, 522 Clark Hall. Transfer students requesting credit for physics courses taken at another college should consult the department office.

The Major

The major program is constructed to accommodate students who wish to prepare for professional or graduate work in physics as well as those who wish to complete their major program in the field of physics but have other post-graduation goals.

Students who wish to major in physics are advised to start the physics sequence in the first term of their freshman year. (Note that students who have had contact with introductory calculus may take Physics 112 with co-registration in Mathematics 191.) The major program can still be completed with a second-term start, but flexibility in future course scheduling is reduced.

Prospective majors are urged to make an early appointment at the physics office for advice in program planning. Acceptance into the major program is normally granted upon completion of a year of physics and mathematics courses at Cornell with all course grades at the B-level or better. The department office will give advice in the matter of selecting a major faculty adviser. Details of the major course program are worked out in consultation between student and major adviser.

Physics Core

Common to all major programs is a requirement to complete a core of physics courses. In addition to the three-term introductory sequence (Physics 112–213–214 or Physics 116–217–218), the core includes five junior-senior courses—(a) the two-course sequence in modern physics (Physics 316–317), (b) at least three semester hours of laboratory work in a course numbered above 300 (i.e., selected from Physics 310, 330, 360, 410), (c) an intermediate course in classical mechanics, and (d) an intermediate course in electromagnetism.

Accompanying these physics courses should be work in mathematics through at least Mathematics 294 or 222. Students following the professional/graduate school channel are expected to complete at least one additional year of applicable mathematics (Applied and Engineering Physics 321–322 or Mathematics 421–422).

In addition to the core, each physics major must complete 15 semester hours of credit in an area of concentration which has been agreed upon by the student and his or her major adviser.

Note: The requirements as stated above apply to all students who will graduate in the class of 1995 or later. Students graduating in 1994 or earlier will be governed by the requirements in effect at the time of their acceptance into the major program. Those earlier requirements included four courses in the core rather than five.

Concentration within Physics

A student who wishes to pursue professional or graduate work in physics or a closely related field should follow a concentration within the field of physics. For those students with a strong high school preparation, the sequence Physics 116–217–218 is encouraged. Core courses in mechanics and electromagnetism will normally be Physics 318 and Physics 325 respectively. The minimum 15 hours beyond the core must be composed of physics courses with numbers greater than 300 and must include the senior laboratory course Physics 410. The following table shows several typical course sequences by means of which the major requirements may be completed. The primary distinction among students who may follow the different sequences is the amount and level of pre-college work in calculus and in physics. Changes in these standard patterns will be common, as agreed upon between student and major faculty adviser.

Concentration outside Physics

The concentration will reflect the student's interest in some area related to physics. The array of courses that comprise the concentration must have internal coherence. The array will normally be worked out in conference with the major faculty adviser and must be approved by the adviser. Of the required 15 hours credit beyond the core, at least 8 credits must be in courses numbered above 300. Students have chosen to concentrate in such topics as chemical physics, astrophysics, natural sciences, history and philosophy of science, computer science, meteorology, or mathematically oriented economics. A combined biology-chemistry concentration is appropriate for pre-medical students or those who wish to prepare for work in biophysics. The concentration in natural science is particularly appropriate for students who wish to prepare for secondary school teaching.

For students with concentrations outside physics, the core requirements in mechanics can be appropriately met with either Physics 431 or Physics 318. For such students, Physics 432 is the normal choice for work in electromagnetism.

Foreign Language Requirement

Students interested in eventual graduate work in physics are advised to meet this College of Arts and Sciences requirement with work in French, German, or Russian.

Honors

A student may be granted honors in physics upon the recommendation of the Physics Advisers Committee of the physics faculty.

Double Majors

Double majors including physics are possible and not at all uncommon. It should be noted, however, that if a student wishes to complete a major in physics as well as a major in one or more other subjects, any course used to satisfy a requirement of the second major may not be used also in satisfaction of any physics major requirement.

Distribution Requirement

The requirement in physical sciences is met by any two sequential courses such as Physics 101–102 or 207–208 or 112–213 or any combination of the first term of one sequence and the second term of another. It is also met by any two general education courses from the group 201–206, 209, 210 or by a combination of 101 or 112 or 207 with one from the group 201–206, 209, 210.

Typical Physics Course Sequences

(The semesters in which 316, 317, 431, 432, and 443 are listed are those that will be available to majors in the classes of 1995 or later.)

Semester	No AP math or physics	1 year AP calculus and good HS physics	Outside concentrators*	Outside concentrators (alternate)
1st – Fall	112	116	112	
2nd – Spring	213	217	213	112
3rd – Fall	214	218, 310	214	213
4th – Spring	316, 310 or 360	316, 318	310	214
5th – Fall	317, 325	317, 325	316	310, 316
6th – Spring	318, 443	360, 443	431 or 318	431 or 318
7th – Fall	341, 410	341, 410	317, 432	317, 432
8th – Spring	Elective(s)	Elective(s)		

*For majors with concentrations outside physics, there will be wide variation in individual programs, arranged to best match the field of concentration.

Crossovers between the two sequences 112–113–214 and 116–217–218 are possible. An exception is the combination 112–213–218, which is not recommended. Physics 207 may be substituted for Physics 112. Students taking 217 after 112 must co-register for 216.

Exceptionally well-prepared students may be able to begin work at Cornell with Physics 217. Such students should come to the department office for advice in planning a course program.

Physics electives include 326, 360, 444, 454, 525, 553, 561, 572, the senior seminars 480–489, Astronomy 332 or 431–432, and Applied and Engineering Physics 434, 436.

Courses with Overlapping Content

Because the department offers several courses with overlapping content, students should select courses carefully to meet the needs of their academic programs and to ensure credit for each course they take. Listed below are groups of courses with similar content. In general, students may receive credit for only one of the courses in each group.

Physics 101, 112, 207
Physics 102, 208
Physics 112, 116, 207
Physics 208, 213, 217

Course Prerequisites

Prerequisites are specified in physics course descriptions to illustrate the materials that students should have mastered. Students who wish to plan programs different from those suggested by the prerequisite ordering are urged to discuss their preparation and background with a physics adviser or with the instructor in the course. In many cases an appropriate individual program can be worked out without exact adherence to the stated prerequisites.

Courses

PHYS 101–102 General Physics
101, fall; 102, spring (101–102 also normally offered in summer). 4 credits each term. Prerequisites: three years of high school mathematics, including some trigonometry. Prerequisite for Physics 102: Physics 101 or 112 or 207. Includes more modern physics and less mathematical analysis than Physics 207–208 but more mathematics than Physics 201–206, 209, 210. (Students planning to major in a physical science should elect Physics 207–208 or 112–213–214.) A mostly self-paced, mastery-oriented autotutorial format; students work in a learning center at hours of their choice. Repeated tests on each unit are given until mastery is demonstrated.
One opening lecture 7:30 p.m., R Aug. 27 or M Aug. 31 (fall); M Jan. 24 (spring). Fall, R. M. Cotts, B. Richardson; spring, B. Cooper, B. Richardson..
Basic principles treated quantitatively but without calculus. Major topics for 101: kinematics; gravitational and electric forces and fields; momentum, angular momentum, energy; thermal physics, fluid mechanics; sound waves. For 102: electricity and magnetism, optics, relativity; quantum physics, particle structure of matter. Laboratory emphasizes instrumentation, measurement, and interpretation of data. At the level of *Principles of Physics*, by Frank J. Blatt.

PHYS 112 Physics I: Mechanics and Heat
Fall or spring (normally also offered in summer). 4 credits. Primarily for students of engineering and for prospective physics majors. Prerequisite: coregistration in Mathematics 192 (or 194 or 112), or substantial previous contact with introductory calculus combined with coregistration in Mathematics 191 or 111.

Lecs M W F 10:10 or 12:20; 2 recs each week; six 3-hr. labs. Evening exams: fall, Sept. 24, Oct. 27, Dec. 1; spring, Feb. 23, Mar. 18, Apr. 22. Fall, J. Parpia; spring, S. McGuire.

Mechanics of particles: kinematics, dynamics, conservation laws, central force fields, periodic motion. Mechanics of many-particle systems: center of mass, rotational mechanics of a rigid body, static equilibrium. Introduction to thermodynamics. At the level of *Fundamentals of Physics*, extended version, by Halliday and Resnick.

PHYS 116 Physics I: Mechanics and Heat

Fall or spring. 4 credits. A more analytic version of Physics 112, intended for students who will be comfortable with a deeper, somewhat more abstract approach. (Intended mainly but not exclusively for prospective physics majors.) Prerequisites: a good secondary school physics course and familiarity with basic calculus. Corrective transfers between Physics 116 and Physics 112 (in either direction) are encouraged during the first few weeks of instruction.

Lecs, M W F 10:10; 2 recs each week; one 3-hr. lab alternate weeks. Evening exams may be scheduled. Fall, D. Rubin; spring, B. Gittelman.

A more rigorous version of Physics 112, covering similar topics at the level of *An Introduction to Mechanics*, by Kleppner and Kolenkow.

PHYS 201 Why the Sky Is Blue: Aspects of the Physical World

Fall. 3 credits.

Lec, T R 2:55–4:10; rec, W 2:30–3:20 or W 3:35–4:25. A. Sadoff.

This is a descriptive physics course aimed specifically at the non–science student. There is an emphasis on the ideas of modern physics where the approach is both historical and thematic. The methodology of science and the nature of evidence is emphasized. An overriding theme is the character of physical laws as shown through the great principles of symmetry and conservation. While there are a few computational problems assigned, the purpose is to help students to understand the concepts rather than to master problem-solving techniques.

[PHYS 203 The Physics of Space Exploration and of Astronomy

Spring. 3 credits. Intended for nonscientists; does not serve as a prerequisite for further science courses. Assumes no scientific background but will use high school mathematics.

Lec, M W F 2:30; disc. W 3:35. Not offered 1992–93.

The principles of physics (plus simple mathematics) are applied to gain knowledge about planets, stars, galaxies, and the universe.]

PHYS 204 Physics of Musical Sound

Spring. 3 credits. Intended for nonscientists; does not serve as a prerequisite for further science courses. Assumes no scientific background but will use high school algebra.

Lec, M W F 2:30; disc, T 3:35 or W 3:35. E. Cassel.

Many features of the production, propagation, and perception of musical sound may be understood in terms of important concepts in physics. Topics covered will include the mechanism of tone production in musical instruments, distinctions in tone quality, musical scales and tuning, some basic principles of room acoustics and reproduction of sound, and aspects of the mechanism of hearing. There will be some lab activities using computers to sample the frequency spectrum of various sounds and wave forms and to generate very simple sounds. Familiarity with computers is not expected. At the level of *The Science of Sound*, by T. D. Rossing.

[PHYS 205 Reasoning about Luck

Fall. 3 credits. Intended for nonscientists; does not serve as a prerequisite for further science courses. Assumes no scientific background but will use high school algebra.

Lecs, M W F 2:30; 5. 1-hr. labs to be arranged. Not offered 1992–93.

An attempt to explain how and when natural scientists can cope rationally with chance. The first part of the course deals in a constructive way with the basic ideas of probability theory and explains why it is that in large systems likely events can become overwhelmingly likely. An introduction to mechanics and to heat as probabilistic mechanics follows. In this way, interested students are given a nontrivial understanding of the second law of thermodynamics, that putative bridge between C. P. Snow's two cultures. Another physical theory, quantum mechanics, in which chance occurs—though in a somewhat mysterious way—is touched on. Approximately five self-paced laboratory experiments will be included.]

PHYS 206 War and Peace in the Nuclear Age (also Government 384)

Spring. 4 credits. Intended for nonscientists; does not serve as a prerequisite to further science courses. Assumes no scientific background but will use high school mathematics.

Lecs, T R 10:10–11:25; 1 rec each week. P. Stein.

This course is intended for any student who wishes to understand the following: the history and evolution of militrary strategy; the developments in 20th-century physics that culminated in the development of the "atomic" bomb; the principles, types, and effects of nuclear weapons; existing and proposed arsenals and delivery systems; the evolution of the nuclear military strategy of the nuclear powers; and the history of nuclear arms-control negotiations. The course will also examine important concepts involved in military strategy and arms control. Much attention will be given to the problem and mechanisms of control of proliferation and weapons of mass destruction. Assignments emphasize quantitative reasoning skills as well as the technical subject matter.

PHYS 207–208 Fundamentals of Physics

207, fall; 208, spring. 4 credits each term. Prerequisites for Physics 207: high school physics plus coregistration in Mathematics 112 or 192, or substantial previous contact with introductory calculus, combined with coregistration in a math course approved by instructor. Prerequisites for Physics 208: Physics 207 (or 112 or 101) and at least coregistration in Mathematics 192 or 112. Physics 207–208 is a two-semester introduction to physics intended for students majoring in a physical science, mathematics, or an analytically oriented biological science.

Lecs M W F 9:05–9:55 or 11:15–12:05; 207 (fall), one rec and one 2-hour lab each week, R. H. Silsbee; 208 (spring) two recs each week; one 3-hour lab alternate weeks, R. O. Pohl. Evening exams: fall, Oct. 8, Nov. 12; spring, Mar. 4, Apr. 20.

207: Mechanics, conservation laws, waves, and topics from thermal physics, fluids, acoustics and properties of matter. 208: Electricity and magnetism, circuits and introduction to physical and geometrical optics. At the level of *University Physics*, by Benson (Wiley 1991).

PHYS 209 Relativity and Chaos

Fall. 3 credits.

Lecs M W F 2:30–3:20; rec T 2:30–3:20; N. D. Mermin.

We will examine two revolutionary fields of classical physics, one venerable and one relatively recent: the special theory of relativity will be developed, with a view to understanding how certain simple but apparently contradictory facts about light lead to extraordinary insights into the nature of time; and the newer subject of "chaos" will be explored, with a view to seeing how extremely simple rules can lead to behavior of breathtaking complexity.

PHYS 210 Randomness in Classical and Quantum Physics

Spring. 3 credits.

Lecs M W F 2:30–3:20; rec T 2:30–3:20; N. D. Mermin.

We will examine two areas of physics where randomness plays a central role: the classical probability theory of gamblers, and its relation to subjects from the nature of coincidence to the direction of the flow of time; and the quantum theory, which promotes randomness from a consequence of human ignorance to a fundamental aspect of the physical world, leading to Einstein's celebrated rejection of a dice-throwing God and his more disturbing complaint about "spooky actions at a distance."

PHYS 213 Physics II: Electricity and Magnetism

Fall or spring (also normally offered in summer). 4 credits. Primarily for students of engineering and for prospective physics majors. Prerequisites: Physics 112 and coregistration in the continuation of the mathematics sequence required for 112.

Lecs, T R 9:05 or 11:15; 2 recs each week; one 3-hr. lab alternate weeks. Evening exams: fall, Oct. 6, Nov. 10; spring, Mar. 4, Apr. 22. Fall, D. Cassel; spring, V. Elser.

Electrostatics, behavior of matter in electric fields, magnetic fields, Faraday's law, Maxwell's equations, electromagnetic oscillations and waves, relativity. At the level of *Fundamentals of Physics*, extended version, by Halliday and Resnick. Laboratory covers electrical measurements, DC and AC circuits, resonance phenomena.

PHYS 214 Physics III: Optics, Waves, and Particles

Fall or spring (also normally offered in summer). 3 or 4 credits. Primarily for students of engineering and for prospective physics majors. Prerequisites: Physics 213 and coregistration in the continuation of the mathematics sequence required for 112. (Physics 310 may be taken, with permission of the instructor, in place of the Physics 214 lab; credit for 214 is then reduced to 3 credits.)

Lecs, T R 9:05 or 11:15; 2 recs each week; one 3-hr. lab alternate weeks. Evening exams: fall, Oct. 6, Nov. 10; spring, Feb. 23, Apr. 1, Apr. 29. Fall, G. P. Lepage; spring, W. Ho.

Physics of wave phenomena, electromagnetic waves, interference and diffraction effects, optics, wave properties of particles, introduction to quantum physics. At the level of *Fundamentals of Physics*, extended version, 3rd edition, by Halliday and Resnick, or *University Physics*, by Hudson and Nelson.

PHYS 216 Introduction to Special Relativity

Fall or spring. 1 credit. Enrollment may be limited. Course will be completed within first month of term. Co-registration in this course is a prerequisite for registration in Physics 217. Prerequisites: Physics 112 or Physics 207 or permission of instructor.

Lecs M W F 8–8:50. Fall, N. W. Ashcroft; spring, staff.

Introduction to Einstein's Theory of Special Relativity. Topics to be covered include the concept of simultaneity, Lorentz transformation, time dilation, the relativistic transformations of velocity, momentum and energy. At the level of *An Introduction to Mechanics* by Kleppner and Kolenkow or *Space and Time in Special Relativity* by Mermin.

PHYS 217 Physics II: Electricity and Magnetism

Fall or spring. 4 credits. Enrollment may be limited. Intended for students who have done very well in Physics 112 or 116 and in mathematics and who desire a more analytic treatment than that of Physics 213. Prospective physics majors are encouraged to select Physics 217. Prerequisites: approval of student's adviser and permission from the instructor. A placement quiz may be given early in the semester, permitting those students who find Physics 217 too abstract or analytical to transfer into Physics 213, which they can do without difficulty at that time. Vector calculus will be taught in this course, but previous contact, especially with the operations grad, div, and curl, is helpful.

Lecs, M W F 10:10, one rec each week; one 3-hr. lab alternate weeks. Evening exams may be scheduled. Fall, R. Lovelace; spring, K. Berkelman,

At the level of *Electricity and Magnetism*, by Purcell (Vol. 2, Berkeley Physics Series).

PHYS 218 Physics III: Optics, Waves, and Particles

Fall or spring. 3 or 4 credits. Enrollment may be limited. A special section of Physics 214. Conditions governing enrollment are similar to those of Physics 217.

Lecs, M W F 11:15, one rec each week; one 3-hr. lab alternate weeks. (Physics 310 may be taken, with permission of the instructor, in place of the regular lab, and credit for 218 is reduced to 3 credits.) Fall, R. Galik; spring, J. Sethna.

Topics covered in recent years have included oscillators, mechanical waves, waves at interfaces, standing waves, electromagnetic waves, guided waves, scattering, interference and diffraction, geometric optics, the doppler effect, and an introduction to matter waves. Evening exams may be scheduled. A more rigorous version of Physics 214.

PHYS 310 Intermediate Experimental Physics

Fall or spring. 3 credits. Enrollment may be limited. Prerequisite: Physics 208 or 213. (May be taken concurrently with Physics 214 or 218 in place of the regular lab work offered in those courses, with permission of student's adviser.)

Labs, T W 1:25–4:25. Fall, E. Cassel; spring, J. Reppy.

Students select from a variety of experiments. An individual, independent approach is encouraged. Facilities of the Physics 410 lab are available for some experiments.

PHYS 315 Phenomena of Microphysics

Fall. 4 credits. Primarily for students of engineering and prospective majors in physics. In spring 1993 and thereafter, this course will be replaced by Physics 316–317. Prerequisites: Physics 214 and Mathematics 294.

Lecs, M W F 9:05, one rec each week. T. Kinoshita.

Introduction to the physics of atoms, solids, nuclei, and elementary particles, emphasizing the description of phenomena using the results of elementary quantum and statistical physics. At the level of *Quantum Physics of Atoms, Molecules, Solids, Nuclei and Particles*, by Eisberg and Resnick.

PHYS 316–317 Modern Physics I and II

3 credits each term. Physics 316 is offered every term, Physics 317 only in fall term. The two courses comprise a two-term sequence and it is assumed that a student registering in Physics 316 will continue with Physics 317. Physics 316 will be offered for the first time in spring 1993, Physics 317 for the first time in fall 1993. Prerequisites: Physics 316: Physics 214 or 218, and coregistration in at least Mathematics 294 or equivalent. Physics 317: Physics 316.

Lecs M W F 9:05–9:55, rec; T 2:30–3:20. Spring, J. Alexander.

Introduction to the physics of microscopic phenomena, emphasizing the use of elementary quantum and statistical mechanics. At the level of *Physics of Atoms, Molecules, Solids, Nuclei, and Particles* by Eisberg and Resnick. Physics 316: Breakdown of classical concepts in microphysics; light quanta and matter waves; Schrödinger equation and solutions in 1 and 3 dimensions; hydrogen atom, exclusion principle, the periodic table. Physics 317: Classical and quantum statistical mechanics; molecules; solid state physics; nuclear physics and radioactivity; elementary particle physics.

PHYS 318 Analytical Mechanics

Spring. 4 credits. Prerequisites: Physics 208 or 214 plus one of Applied and Engineering Physics 321, Mathematics 421, 422 or 423, or permission of instructor. Intended for physics majors concentrating in physics. Similar material is covered in Physics 431 at a less demanding analytical level. (Applied and Engineering Physics 333 is approximately equivalent to Physics 318.)

Lecs, M W F 10:10, F 2:30. L. Hand.

Newtonian mechanics of particles and systems of particles, including rigid bodies; oscillating systems; gravitation and planetary motion; moving coordinate systems; Euler's equations; Lagrange's equations; Hamilton's equations; normal modes and small vibrations. At the level of *Classical Mechanics*, by Goldstein.

PHYS 325 Electricity and Magnetism

Fall. 4 credits. Prerequisites: Physics 214 plus coregistration in one of Applied and Engineering Physics 321, Mathematics 421, 422, or 423, or permission of instructor. Intended for physics majors concentrating in physics. Similar material is covered in Physics 432 at a less demanding analytical level.

Lecs, M W F 11:15, F 2:30. A. LeClair.

Electrostatics: electric charge and fields, potential, multipoles, conductors, Laplace equation and formal solutions, field energy, dielectric materials, polarization. Magnetostatics: currents, magnetic fields and vector potential, dipoles, magnetic materials, field energy. Maxwell's equations. Special relativity. At the level of *Introduction to Electro-dynamics*, by Griffiths.

PHYS 326 Electromagnetic Waves and Physical Optics

Spring. 4 credits. Prerequisite: Physics 325.

Lecs, M W F 11:15, R 2:30. P. Lepage.

Electrodynamics: applications of Maxwell's equations, propagation in various media, radiation, relativistic electrodynamics, transmission lines and wave guides, interference and diffraction phenomena. At the level of *Classical Electromagnetic Radiation*, by Marion and Heald.

PHYS 330 Modern Experimental Optics

Fall. 4 credits. Enrollment limited. Prerequisite: Physics 214 or equivalent.

Lec, M 2:30; lab, T R 1:25–4:15. D. M. Lee.

A practical laboratory course in basic and modern optics. Students spend two-thirds of the course experimenting with the physics of basic optical phenomena: interference, diffraction, coherence, polarization, and image formation. The last part of the course involves a choice among experiments on lasers and applications of lasers, light pulses and optical communication, and holography. The course also serves as an introduction to the use of optical equipment and techniques that are employed in current research in the fields of biology, chemistry, physics, and astronomy.

PHYS 341 Thermodynamics and Statistical Physics

Fall. 4 credits. Prerequisites: Physics 214 and Mathematics 294.

Lecs, T R 9:05–9:55, F 10:10–11, T 2:30. V. Ambegaokar.

Statistical physics, developing both thermodynamics and statistical mechanics simultaneously. Concepts of temperature, laws of thermodynamics, entropy, thermodynamic relations, free energy. Applications to phase equilibrium, multicomponent systems, chemical reactions, and thermodynamic cycles. Application of statistical mechanics to physical systems; introduction to treatment of Maxwell-Boltzmann, Bose-Einstein, and Fermi-Dirac statistics with applications. Elementary transport theory. At the level of *Fundamentals of Statistical and Thermal Physics*, by Reif, or *Thermal Physics*, by Morse.

PHYS 360 Electronic Circuits (also Applied and Engineering Physics 363)

Fall or spring. 4 credits. Prerequisite: Physics 208 or 213 or permission of instructor. No previous experience with electronic circuits is assumed; however, the course moves through the introductory topics (DC and AC circuits, basic circuit elements) rather quickly. Students wishing a more complete background might consider taking Electrical Engineering 210 before Physics 360. Fall term is usually less crowded.

Lec, M 2:30–4:25; labs, T R or W F 1:25–4:25 (also M W 7:30–10:30 pm in spring). Fall, E. Kirkland; spring, R. Thorne.

An experimental survey of some devices and circuits in two general areas: analog and digital electronics. The analog circuits

covered include operational amplifiers, filters, diodes, biopolar and field effect transistors. The digital circuits covered include combinatorial (gates) and sequential (flip flops and counters) logic. Simple microcomputer interfacing and programming is then used to investigate digital to analog and analog to digital (DAC, ADC) conversion.

PHYS 400 Informal Advanced Laboratory
Fall or spring; (also offered during summer). Variable credit. Prerequisites: two years of physics and permission of instructor.

Lab, T W 1:25–4:25, see Physics 410.
Experiments of widely varying difficulty in one or more areas, as listed under Physics 410, may be done to fill the student's special requirements.

PHYS 410 Advanced Experimental Physics
Fall or spring. 4 credits. Limited to seniors except by special permission. Prerequisites: Physics 214 (or 310 or 360) plus 318 and 325, or permission of instructor.

Lec, M 2:30–4:25; labs, T W 1:25–4:25. Fall, R. Pohl and staff; spring, D. L. Hartill and staff.
Selected topics in experimental concepts and techniques. About seventy different experiments are available in acoustics, optics, spectroscopy, electrical circuits, electronics and ionics, magnetic resonance, X-rays, low temperature, solid state, cosmic rays, nuclear physics. The student performs three to six diverse experiments, depending on difficulty, selected to meet individual needs and interests. Independent work is stressed.

PHYS 431–432 Introductory Theoretical Physics I and II
431, fall; 432, spring. 4 credits each term. Prerequisites: Physics 431: Physics 207–208 or equivalent and Mathematics 294 or equivalent. Physics 432: Physics 431 or equivalent. (Applied and Engineering Physics 321 or Mathematics 421 is recommended.) Primarily for physics majors with concentrations outside physics and for graduate students in a science other than physics (such as chemistry, engineering, biology, geology). Physics 318 and 325 cover similar material at a higher analytical level and are intended for physics majors concentrating in physics.

Lecs, M W F 10:10 and F 1:25. Fall, C. Franck; spring, D. Lee.
431: Mechanics. Includes Newtonian mechanics, Lagrange's and Hamilton's equations, central forces, rigid-body motion, and small oscillations. At the level of *Classical Dynamics*, by Marion and Thornton.
432: Electricity and magnetism. Includes electrostatics, magnetostatics, boundary value problems, dielectric and magnetic media. Maxwell's equations and electromagnetic waves, introduction to special relativity. At the level of *Introduction to Electrodynamics*, by Griffiths.

PHYS 443 Introductory Quantum Mechanics
Fall. 4 credits. Prerequisites: Physics 318 and 325, or 431–432; Physics 315 and Applied and Engineering Physics 321 or Mathematics 421; or permission of instructor.

Lecs, M W F 9:05, F 2:30. Evening exams may be scheduled. V. Elser.
Introduction to concepts and techniques of quantum mechanics, at the level of *Introduction to Quantum Mechanics*, by Dicke and Wittke.

PHYS 444 Nuclear and High-Energy Particle Physics
Spring. 4 credits. Prerequisite: Physics 443 or permission of instructor.

Lecs, M W F 9:05, F 1:25. D. Rubin.
Behavior of high-energy particles and radiation; elementary particles; basic properties of accelerators and detectors; general symmetries and conservation laws. At the level of *Concepts of Particle Physics*, by Gottfried and Weisskopf.

PHYS 454 Introductory Solid-State Physics
Fall or spring. 4 credits. Prerequisite: Physics 443 or Chemistry 793, or permission of instructor.

Lecs, fall, M W F 10:10, W 3:35, G. Chester; spring, T R 10:10–11:25, R 3:35, R. Silsbee.
An introduction to modern solid-state physics, including lattice structure, lattice vibrations, thermal properties, electron theory of metals and semiconductors and selected topics from magnetic properties, optical properties, superconductivity and defects. At the level of *Introduction to Solid State Physics*, by Kittel or *Solid State Physics*, by Ashcroft and Mermin.

PHYS 480–489 Special Topics Seminar
Spring. 2 and 3 credits. Limited to senior physics majors and those who receive permission of instructor. S-U grades only.

Hours to be arranged. One selected topic of current interest is studied. Students participate in organization and presentation of material.

PHYS 480 Computational Physics
Spring. 3 credits, S-U only. Prerequisites: Applied and Engineering Physics 321–322 or Math 421–423 or equivalent, and the ability to write programs in any computer language. No previous knowledge of numerical analysis is assumed.

Lec T R 10:10–11:25. S. Teukolsky.
Course content is essentially identical to Physics 680, but a different grading system will be used for undergraduates.

PHYS 490 Independent Study in Physics
Fall or spring. 1–3 credits. Ordinarily limited to seniors. Prerequisite: permission of professor who will direct proposed work. Copy of request for independent study form must be filed with physics department course coordinator. Individual project work (reading or laboratory) in any branch of physics.

PHYS 500 Informal Graduate Laboratory
Fall, spring; (also offered during summer.) Variable credit. By permission of instructor.

PHYS 510 Advanced Experimental Physics
Fall, spring, or summer. 3 credits.

Labs, T W 1:25–4:25. Fall, R. Pohl and staff; spring, D. L. Hartill and staff.
About seventy different experiments are available in acoustics, optics, spectroscopy, electrical circuits, electronics and ionics, magnetic resonance, X-rays, low temperature, solid state, cosmic rays, nuclear physics. Students perform four to eight experiments selected to meet individual needs. Independent work is stressed.

PHYS 520 Projects in Experimental Physics
Fall, spring, or summer. 1–3 credits. To be supervised by faculty member. Students must advise department course coordinator of faculty member responsible for their project. Prerequisite: Physics 510.
Projects of modern topical interest that involve some independent development work by student. Opportunity for more initiative in experimental work than is possible in Physics 510.

[PHYS 525 Physics of Black Holes, White Dwarfs, and Neutron Stars (also Astronomy 511, High-Energy Astrophysics)
Spring. 4 credits.

Lecs, T R 1:25–2:40. S. L. Shapiro. Not offered 1992–93.
The formation of compact objects: neutrino and gravitational radiation from supernova collapse and neutron stars. Equilibrium configurations, equations of state, stability criteria, and mass limits. The influence of rotation and magnetic fields. Pulsar phenomena. Mass flow in binary systems; spherical and disk accretion; high-temperature radiation processes. Compact X-ray sources and X-ray bursts. Emphasis will be on the application of fundamental physical principles to compact objects. Topics in diverse areas of physics will be discussed: solid-state physics, nuclear physics, relativity, fluid dynamics, high-energy physics, etc. No astronomy or general relativity prerequisites. Text: *Physics of Black Holes, White Dwarfs, and Neutron Stars*, by Shapiro and Teukolsky.]

[PHYS 551 Classical Mechanics
Fall. 3 credits. Prerequisite: an undergraduate course in classical mechanics at the level of books by K. Symon or J. B. Marion.

Lecs, T R 10:10, R 2:30. Not offered 1992–93.
Lagrangian and Hamiltonian formulation of classical mechanics, with modern applications in nonlinear dynamics. Foundations will be taught at the level of *Mathematical Methods in Classical Mechanics*, by Arnold.]

PHYS 553–554 General Relativity (also Astronomy 509–510)
553, fall; 554, spring. 4 credits. Prerequisite: knowledge of special relativity at the level of Classical Mechanics, by Goldstein.

Lecs, T R 1:25–2:40. S. L. Shapiro.
Physics 553 is a systematic introduction to Einstein's theory, with emphasis on modern coordinate-free methods of computation. Topics include review of special relativity, modern differential geometry, foundations of general relativity, laws of physics in the presence of a gravitational field, experimental tests of gravitation theories. At the level of *Gravitation*, by Misner. Physics 554 is a continuation of 553 that emphasizes applications to astrophysics and cosmology. Topics include relativistic stars, gravitational collapse and black holes, gravitational waves, cosmology.

PHYS 561 Classical Electrodynamics
Fall. 3 credits.

Lecs, T R 8:30–9:55, one sec per week. S. Teukolsky.
Maxwell's equations, electromagnetic potentials, electrodynamics of continuous media (selected topics), special relativity, radiation theory. At the level of *Classical Electrodynamics*, by Jackson.

PHYS 562 Statistical Mechanics
Spring. 4 credits. Primarily for graduate students. Prerequisites: a good knowledge of quantum mechanics (at the level of Merzbacher), classical mechanics (at the level of Marion), and statistical mechanics (at the level of Reif).

Lecs, T R 8:30–9:55. N. W. Ashcroft.
Thermodynamic functions, equations of state; Second Law phase equilibria; thermodynamic inequalities; kinetic theory, Boltzmann's equation, transport theory. Microstates, ensembles, partition functions, and phase-space averaging. Chemical equilibria. Quantum statistical mechanics, Fermi-Dirac and Bose-Einstein distributions; application to Bose and Fermi systems. Fundamentals of statistical mechanics: density matrix, reduced distribution, Wigner function, correlation functions and fluctuations. Advanced topics include Ising model, lattice gases, and spin systems; and introduction to critical phenomena. At the level of *Statistical Mechanics*, by Huang, and *Statistical Mechanics*, by Pathria.

PHYS 572 Quantum Mechanics I
Fall or spring. 4 credits.
Lecs, fall, M W F 9:05, D. Yennie; spring, M W F 11:15. Staff.
The formulation of quantum mechanics in terms of states and operators. Symmetries and the theory of angular momentum. Stationary and time-dependent perturbation theory. Fermi's golden rule and variational methods. The elements of scattering theory. At a level between *Quantum Mechanics*, by Merzbacher, and *Quantum Mechanics*, by Landau and Lifshitz. Familiarity with elementary aspects of the Schroedinger equation is assumed, including its application to simple systems such as the hydrogen atom.

PHYS 574 Quantum Mechanics II
Fall or spring. 4 credits. Required of all Ph.D. majors in theoretical physics.
Lecs, fall, M W F 9:05; spring, M W F 11:15. Fall, E. Siggia; spring, T-M. Yan.
Discussion of various aspects of quantum mechanics, such as path integral formulation, collision theory, theory of spectra of atoms and molecules, theory of solids, second quantization, emission of radiation, relativistic quantum mechanics. At the level of *Lectures on Quantum Mechanics*, by Gordon Baym.

PHYS 635 Solid-State Physics I
Fall. 3 credits. Prerequisites: Physics 562, 572 and some exposure to solid-state physics, such as Physics 454.
Lecs, T R 11:40–12:55. J. Sethna.
A survey of the basics of the physics of solids. Metals, crystal structures, electron and phonon states, semiconductors, dielectric properties, electric and thermal conductivity. At the level of *Solid State Physics*, by N. W. Ashcroft and N. D. Mermin.

PHYS 636 Solid-State Physics II
Spring. 3 credits.
Lecs, T R 11:40–12:55. C. Henley.
A continuation of Physics 635; magnetism, superconductivity, broken symmetries, elementary excitations, and other topics in quantum condensed matter physics not covered in *Solid State Physics* by Ashcroft and Mermin, such as topological defects, superfluids, the quantum Hall effect, mesoscopic quantum transport theory, disordered systems, Anderson localization and other metal-insulator transitions.

PHYS 645 High-Energy Particle Physics
Fall. 3 credits.
Lecs, M W F 11:15. B. Gittelman.
Introduction to the physics of baryons, mesons, and leptons. Strong, electromagnetic, and weak interactions. Relevance of symmetry laws to particle physics. Introduction to the quark model. Unification of weak and electromagnetic interactions. At the level of *Introduction to High Energy Physics*, by Perkins.

[PHYS 646 High-Energy Particle Physics
Spring. 3 credits. Not offered 1992–93.
Lecs, T R 2:55–4:10. Staff.
Topics of current interest, such as high-energy electron and neutrino interactions, electron positron annihilation, and high-energy hadronic reactions, are surveyed. Lectures and reading material are at the level of *Introduction to High Energy Physics*, by Perkins.]

***Note:* Only S-U grades will be given in courses numbered 650 or above.**

PHYS 651 Relativistic Quantum Field Theory I
Fall. 3 credits. S-U grades only.
Lecs, M W F 11:15–12:05. K. Gottfried.
Introduction to relativistic field theories, with emphasis on applications to quantum electrodynamics. Topics to be covered include canonical field quantization, perturbation theory, calculation of cross sections for elementary processes, renormalization, and applications to non-electromagnetic interactions.

PHYS 652 Relativistic Quantum Field Theory II
Spring. 3 credits. S-U grades only.
Lecs, T R 10:10–11:25. B. Greene.
This course is a continuation of Physics 651 and introduces more advanced methods and concepts in quantum field theory. Topics include functional integral methods, quantization of non-abelian gauge theories, the renormalization group, dispersion relations, and spontaneous symmetry breaking. Applications to the electroweak theory and quantum chromodynamics are emphasized.

PHYS 653 Statistical Physics
Fall. 3 credits. Normally taken by graduate students in their second or later years. Prerequisites: Competence in the basic principles of quantum mechanics, statistical physics at the level of Physics 562, and thermodynamics. S-U grades only.
Lecs, T R 2:30–4:00. C. Henley.
Survey of topics in modern statistical physics: Dynamical statistical physics (kinetic theory, Boltzmann equation, hydrodynamics); theory of simple fluids; scaling theories and the renormalization group; phase transitions in disordered systems; pattern formation in nonlinear systems, percolation theory.

PHYS 654 Theory of Many-Particle Systems
Spring. 3 credits. Prerequisites: Physics 562, 574, 635, 636, and 653. S-U grades only.
Lecs, W F 2:30–4. V. Ambegaokar.
Equilibrium and transport properties of microscopic systems of many particles studied at zero and finite temperatures. Formalisms such as thermodynamic Green's functions introduced and applied to such topics as normal and superconducting Fermi systems, superfluidity, magnetism, insulating crystals.

PHYS 661 Advanced Topics in High Energy Particle Theory
Fall. 3 credits. Prerequisites: Physics 652. S-U grades only.
Lecs, T R 10:10–11:25. B. Greene.
This course will present advanced topics of current research interest. Subject matter will vary from year to year. Some likely topics are two-dimensional conformal field theory with applications to string theory and condensed matter physics, applications of the electroweak theory, lattice guage theory, mathematical methods (e.g. group theory), perturbative quantum chromodynamics, anomalies and geometry, current algebra, and phenomenological issues beyond the standard model.

PHYS 665 Topics in Theoretical Astrophysics (also Astronomy 699)
Fall. 2 credits.
Lecs, M 2:30–4. E. E. Salpeter.
An informal seminar meeting Mondays (and occasionally Wednesdays) for advanced graduate students in astronomy or physics. Topic this year: Theories of Star Formation.

[PHYS 667 Theory of Stellar Structure and Evolution (also Astronomy 560)
Fall. 4 credits. S-U grades only. Not offered 1992–93.
Lec, M W F 1:25. E. E. Salpeter.
Summary of observational facts on stars; dimensional analysis; nuclear reactions and energy, transport in stellar interiors; models for static and evolving stars. At the level of *Principles of Stellar Energy and Nucleosynthesis*, by Clayton.]

PHYS 680 Computational Physics (also Astronomy 690)
Spring. 3 credits. S-U only. Prerequisites: The course assumes a good background in the standard "mathematical methods for physics," and the ability to write programs in any computer language. No previous knowledge of numerical analysis is assumed.
Lecs T R 10:10–11:25. S. Teukolsky.
A course designed to familiarize students with numerical techniques for solving diverse problems in physics and related fields. The problems will be drawn from many different branches of physics, but the emphasis will be on common techniques of solution. Numerical techniques discussed in the course will include ordinary and partial differential equations, linear algebra and eigenvalue problems, Monte Carlo techniques, solving nonlinear equations, fast Fourier transforms, etc. In contrast to traditional numerical analysis courses, the flavor of the course will be "how-to," rather than theoretical. No theorems will be proved. Students will be expected to solve, both individually and in small teams, assigned numerical exercises. Text: *Numerical Recipes: The Art of Scientific Computing*, by Press, Flannery, Teukolsky, and Vetterling.

PHYS 681–689 Special Topics
Offerings are announced each term. Typical topics are group theory, analyticity in particle physics, weak interactions, superfluids, stellar evolution, plasma physics, cosmic rays, general relativity, low-temperature physics, X-ray spectroscopy or diffraction, magnetic resonance, phase transitions, and the renormalization group.

PHYS 690 Independent Study in Physics
Fall or spring. Variable credit. Students must advise department course coordinator of faculty member responsible for their project. S-U grades only. Special graduate study in some branch of physics, either theoretical or experimental, under the direction of any professional member of the staff.

PORTUGUESE

See Modern Languages and Linguistics.

PSYCHOLOGY

D. J. Bem, S. L. Bem, E. M. Blass, U. Bronfenbrenner, J. E. Cutting, R. B. Darlington, T. J. DeVoogd, D. A. Dunning, H. M. Feinstein, D. J. Field, B. L. Finlay, E. J. Gibson, T. D. Gilovich, D. Gudermuth, B. P. Halpern, A. M. Isen, R. E. Johnston, F. C. Keil, K. L. Keil, B. Khurana, C. L. Krumhansl, W. W. Lambert, H. Levin, D. A. Levitsky, J. B. Maas, R. D. Mack, H. S. Porte, D. T. Regan, E. A. Regan, T. A. Ryan, J. Sereno, E. S. Spelke, B. J. Strupp

The major areas of psychology represented in the department are human experimental psychology, biopsychology, and personality and social psychology. These areas are very broadly defined, and the courses are quite diverse. Biopsychology includes such things as animal learning, neuropsychology, interactions between hormones, other biochemical processes, and behavior. Human experimental psychology includes such courses as cognition, perception, memory, and psycholinguistics. Personality and social psychology is represented by courses and fieldwork in psychopathology as well as courses in social psychology and personality (such as Psychology and Law, Judgment and Decision Making, and sex roles). In addition to the three major areas mentioned above, the department also emphasizes the statistical and logical analysis of psychological data and problems.

The Major

Admission to the major is usually granted to any student in good standing in the college who has passed three or more psychology courses with grades of C+ or better. Provisional admission requires two such courses. To apply to the major and receive an adviser, take a major application form from the wall rack in the department office (211 Uris Hall), fill out both sides, and take it to one of the faculty members whose name is listed on the form.

Requirements for the major are:

1) a total of 40 credits in psychology (including prerequisites), from which students majoring in psychology are expected to choose, in consultation with their advisers, a range of courses that covers the basic processes in psychology (laboratory and/or field experience is recommended); and
2) demonstration of proficiency in statistics before the beginning of the senior year. (See the section below on the statistics requirement.)

Normally it is expected that all undergraduate psychology majors will take at least one course in each of the following three areas of psychology:

1) **Human experimental psychology**
2) **Biopsychology**
3) **Social, personality, and abnormal psychology**

The following classification of Department of Psychology offerings is intended to help students and their advisers choose courses that will ensure that such breadth is achieved.

1) **Human experimental psychology:** Psychology 205, 209, 214, 215, 305, 308, 309, 311, 313, 314, 316, 342, 345, 370, 412, 414, 415, 416, 417, 418, 436, 492, 605, 609, 612, 614, 615, 616, 618, 642, 670, 692, 709, 713, 714, 715, 717.
2) **Biopsychology:** Psychology 123, 276, 307, 322, 324, 326, 332, 361, 375, 396, 422, 425, 429, 492, 607, 622, 625, 626, 629, 675, 676, 692, 696, 722.
3) **Social, personality, and abnormal psychology:** Psychology 128, 225, 226, 255, 265, 275, 277, 280, 327, 328, 379, 380, 383, 389, 402, 404, 426, 450, 467, 468, 469, 481, 482, 489, 491, 650, 689, 691.
4) **Other courses:** Psychology 101, 103, 199, 347, 350, 410, 440, 441, 465, 470, 471, 472, 473, 475, 476, 478, 479, 490. The major adviser determines to which group, if any, these courses may be applied.

With the permission of the adviser, courses in other departments may be accepted toward the major requirements.

Fieldwork, independent study, and teaching. The department requires students to observe the following limits on fieldwork, independent study, and teaching.

1) Undergraduates may not serve as teaching assistants for psychology courses if they are serving as teaching assistants for any other course during the same semester.
2) An undergraduate psychology major cannot apply more than 12 of the credits earned in independent study (including honors work) and fieldwork toward the 40 credits required by the major.

Statistics requirement. Proficiency in statistics can be demonstrated in any one of the several ways listed below.

1) Passing Psychology 350.
2) Passing an approved course or course sequence in statistics in some other department at Cornell. The approved list of courses and sequences may change. It has usually included Education 352 and 353, Industrial and Labor Relations 210 and 211, and Sociology 301. Requests that a particular course be added to this list may be made to Professor Gilovich.
3) Passing a course or course sequence in statistics at some other college, university, or college-level summer school. The course or sequence must be equivalent to at least 6 semester credits. The description of the course from the college catalog and the title and author of the textbook used must be submitted to Professor Gilovich for approval.
4) Passing an exemption examination. This examination can be given at virtually any time during the academic year if the student gives notice at least one week before. Students who have completed a theoretical statistics course in a department of mathematics or engineering and who wish to demonstrate competence in applied statistics usually find this option the easiest. Students planning this option should discuss it in advance with Professor Gilovich.

Concentration in biopsychology. Psychology majors interested in psychology as a biological science can elect to specialize in biopsychology. Students in this concentration must meet all of the general requirements for the major in psychology and must also demonstrate a solid background in biology; the physical sciences, including at least introductory chemistry; and mathematics. Students will design with their advisers an integrated program in biopsychology built around courses on physiological, chemical, anatomical, and ecological determinants of human and nonhuman behavior offered by the Department of Psychology. Additional courses in physiology, anatomy, biochemistry, neurochemistry, neurobiology, and behavioral biology may be designated as part of the psychology major after consultation between the student and his or her biopsychology adviser.

Concentration in personality and social psychology. This concentration is offered in cooperation with the Department of Sociology. Psychology majors who wish to specialize in social psychology are expected to meet the general requirements set by their department, including statistics. To ensure a solid interdisciplinary grounding, students in the concentration will be permitted to include some major courses in sociology and related fields. Advisers will assist students in the selection of a coherent set of courses from social organization, cultural anthropology, experimental psychology, social methodology, and several aspects of personality and social psychology. Seniors in the concentration may elect advanced and graduate seminars, with the permission of the instructor.

Undergraduate honors program. The honors program is designed for those exceptionally able students who wish to pursue an intensive and independent program of research in psychology. Successful participation in this program serves as evidence of the student's facility in the two most important skills of an academic psychologist: the capacity to acquire and integrate a substantial body of theoretical and factual material and the ability to engage in creative research activity. All qualified students planning on a graduate education in psychology or other academic fields should consider the honors program seriously. The program offers most students the closest contact and consultation with faculty that they will receive during their time at Cornell.

The core of the honors program is a research project that the student carries out in close collaboration with a faculty member in the field of psychology. It is assumed that most students will do so while enrolled in Psychology 470 (Undergraduate Research in Psychology). A written report of the research is to be given to the chair of the honors committee (currently Professor Dunning) toward the end of the last semester of the student's senior year. An oral defense of the thesis is then given before a committee of three faculty members, and the student presents his or her work in a public forum. Final honors standing (summa cum laude, magna cum laude, cum laude) is indicated on the student's diploma. The T. A. Ryan Award, accompanied by a cash prize, is awarded to the student who conducts the best honors project in a given year.

A student may formally apply to the honors program at any time during the senior year provided that she or he is actively engaged in independent research. However, students must do so by the second week of November. Applications should be given to Professor Dunning and should be made directly by the student.

Distribution Requirement

The distribution requirement in the social sciences is satisfied by any two courses in psychology with the exception of Psychology 123, 276, 307, 322, 324, 326, 332, 350, 361, 396, 422, 425, 429, 470, 471, 472, 473, 475, 476, 479, 491, 492, 607, 622, 625, 626, 629, 676, 696, and 722.

Courses

PSYCH 101 Introduction to Psychology: The Frontiers of Psychological Inquiry
Fall. 3 credits. Students may not receive credit for both Psychology 101 and Education 110. Students who would like to take a discussion seminar should also enroll in Psychology 103.
M W F 10:10. J. B. Maas. Prelims: 7:30 p.m., Sept. 29, Nov. 3.
The study of human behavior. Topics include brain functioning and mind control, psychophysiology of sleep and dreaming, psychological testing, perception, learning, cognition, memory, language, motivation, personality, abnormal behavior, psychotherapy, social psychology, and other aspects of applied psychology. Emphasis is on developing skills to critically evaluate claims made about human behavior.

PSYCH 103 Introductory Psychology Seminars
Fall. 1 credit. Limited to 400 students. Prerequisite: concurrent enrollment in Psychology 101.
Hours to be arranged; 32 different time options. J. B. Maas and staff.
A weekly seminar that may be taken in addition to Psychology 101 to provide an in-depth exploration of selected areas in the field of psychology. Involves extensive discussion and a term paper related to the seminar topic. Choice of seminar topics and meeting times will be available at the second lecture of Psychology 101.

[PSYCH 109 Freshman Writing Seminar: The Science of Dreaming Sleep
Fall. 3 credits. Prerequisite: AP biology and chemistry. Limited to 17 students. Not offered 1992–93.
T R 11:40–12:55. H. Porte.]

PSYCH 123 Introduction to Biopsychology
Fall. 3 credits. No prerequisites. Can be used to satisfy the psychology major breadth requirement and as an alternative prerequisite for upper-level biopsychology courses.
M W F 10:10. E. A. Regan.
An introduction to psychology from a biological perspective, including both evolutionary and physiological approaches to behavior, and including both human and nonhuman animal behavior. Specific topics include the structure, function, and development of the nervous system, stress and disease, sleep, genetic and chemical models of mental disorder, and hormones and sexual behavior; biological bases of learning, cognition, communication, and language; and the ecology and evolution of social organization and social development.

PSYCH 128 Introduction to Psychology: Personality and Social Behavior
Summer only. 3 credits.
M–F 11:30–12:45 plus another time to be arranged. Staff.
Personality: the behavioral similarities and differences among people and how they develop; Freudian, learning, and humanistic theories of personality; research in personality; and personality assessment through testing. Social behavior: how people behave in interactions with others; attitudes, persuasion, attraction, aggression, and conformity. How personality and social behavior influence each other and cause many interesting social and psychological phenomena.

PSYCH 199 Sports Psychology
Summer only. 3 credits.
M–F 11:30–12:45. Staff.
Research and theory in sports psychology. Combines clinical psychology, social psychology, exercise physiology, and biochemistry. Aggression, stress, drug abuse, injury and injury rehabilitation, youth sports, and the importance of winning. Fieldwork experiences in exercise physiology and exercise testing, biofeedback, and current intervention strategies.

Introductory courses in cognitive psychology. Each of the following four courses (205, 209, 214, 215) provides an introduction to a major area of study within cognitive psychology. These courses are independent of one another, and none has any prerequisites. Students may take any one of the courses or any combination of them (including all four). Courses may be taken in any order or simultaneously.

PSYCH 205 Perception
Spring. 3 credits. Open to first-year students. Graduate students, see Psychology 605.
T R 2:55–4:10. Staff.
One of four introductory courses in cognitive psychology. Basic perceptual concepts and phenomena are discussed with emphasis on stimulus variables and sensory mechanisms. All sensory modalities are considered. Visual and auditory perception are discussed in detail.

PSYCH 209 Developmental Psychology
Spring. 4 credits. Graduate students, see Psychology 709.
W 7:30–10:30 p.m.; sec to be arranged. F. Keil.
One of four introductory courses in cognitive psychology. A comprehensive introduction to current thinking and research in developmental psychology. The course focuses on development of action, development of perception and knowledge, and development of language, morality, and other aspects of human culture.

PSYCH 214 Introduction to Cognitive Psychology
Spring. 3 credits. Sophomore standing required. Graduate students, see Psychology 614.
M W F 1:25. B. Khurana.
Various approaches to the study of cognition will be discussed. Basic concepts in how humans process different kinds of information such as visual, auditory, and symbolic will be introduced. These concepts will then be used to explore topics such as attention and consciousness, concept formation and representation, memory structures systems, imagery and cognitive maps, problem solving and reasoning, judgment and choice, language acquisition and comprehension, intelligence and creativity, and social cognition.

PSYCH 215 Psycholinguistics
Fall. 3 or 4 credits (4-credit option involves term paper). Graduate students, see Psychology 715.
M W F 11:15. J. Sereno.
One of four introductory courses in cognitive psychology. Introduction to the psychological study of language. Covers basic linguistic theory and contemporary research into language comprehension, production, and acquisition.

PSYCH 225 Introductory Psychopathology
Fall. 3 credits. Prerequisite: a course in introductory psychology. Students who would like to take a discussion seminar should also enroll in Psychology 226. May be taken concurrently with Psychology 327. Enrollment in Psychology 327 is limited.
T R 1:25–2:40. R. D. Mack.
A survey of the various forms of psychopathology, as they relate to the experiences of human growth and development. Presents a description of the major syndromes, investigations, theories of etiology, and approaches to treatment from a humanistic psychodynamic perspective.

PSYCH 226 Introductory Psychopathology Seminars
Fall. 1 credit. Limited to 90 students. Prerequisite: must be concurrently enrolled in Psychology 225. Letter grade only.
Hours to be arranged; 9 different time options. R. D. Mack and staff.
A weekly seminar/discussion section that may be taken in addition to Psychology 225 to provide an in-depth exploration of selected areas in the field of psychopathology. Involves extensive discussion and several short papers related to seminar topics. Choice of seminar topics and meeting times will be available at the second or third lecture of Psychology 225.

PSYCH 255 Psychology and Medicine
Fall. 3 credits. Limited to 60 students.
T R 11:40–12:55. H. Levin.
This course treats the implications of psychological theory and research for selected contemporary issues in medicine. The topics to be covered include: who are the people who choose medicine as a profession—family background, political and social beliefs. Satisfactions and frustrations in a medical career. Communication between doctors and patients. Diagnosis as decision making with incomplete information. The use of expert systems in medicine. Addictions and behavior change as related to drugs, smoking, and food. Psychoneuroimmunology. The relations of personality to heart disease and longevity. This course will not concern psychopathology.

PSYCH 265 Psychology and Law
Fall. 3 credits. Prerequisite: an introductory psychology course.
M W F 1:25. D. Dunning.
This course examines the implications of psychological theory and methods for law and the criminal justice system. We concentrate on psychological research on legal topics (e.g., confession, eyewitness testimony, jury decision making, homicide, aggression, the

prison system), social issues (e.g., death penalty, affirmative action), as well as on psychologists as participants in the legal system (e.g., assessing insanity and dangerousness and for expert testimony).

PSYCH 275 Introduction to Personality Psychology
Fall. 3 credits. Prerequisite: an introductory psychology course.
T R 10:10–11:25. D. Bem.
An introduction to research and theory in personality psychology, emphasizing contemporary approaches. Topics include the dynamics, structure, and assessment of personality as well as personality development and change. Biological and sociocultural influences on personality are also considered.

[PSYCH 276 Motivation (also Nutritional Science 276)
Spring. 3 credits. Graduate students, see Psychology 676/Nutritional Science 676. Not offered 1992–93.
T R 10:10–11:25. E. Blass.
The course surveys traditional and contemporary approaches to motivational behavior from Aristotle to Freud to Skinner to Lorenz. It also draws upon field studies, laboratory analyses, clinical cases and developmental stages to establish a scientific basis for motivation analysis. Normal and pathological feedings will serve as a target behavior.]

PSYCH 277 Psychology of Sex Roles (also Women's Studies 277)
Spring. 3 credits. Limited to 300 students.
T R 2:55–4:10. S. Bem.
This course addresses the very broad question of how an individual's gender and sexuality are constructed. Although some attention is given to biological perspectives, the course emphasizes the social-psychological processes by which the culture transforms male and female newborns into "masculine" and "feminine" adults. In addition to being quite interdisciplinary, the course is also oriented to questioning the "naturalness" of not only masculinity and femininity themselves, but exclusive heterosexuality as well. Among some of the specialized topics discussed are psychological androgyny, equalitarian relationships, gender-liberated child-rearing, the male-centeredness of the workworld, female sexuality, sexual harassment, and homophobia.

PSYCH 280 Introduction to Social Psychology
Spring. 3 or 4 credits; the additional (or fourth) credit is given for the completion of a group research project and write-up. Prerequisite: an introductory psychology course.
T R 10:10–11:25. T. Gilovich and D. Regan.
An introduction to research and theory in social psychology. Topics include processing of social information; social influence, persuasion, and attitude change; social interaction and group phenomena.

[PSYCH 305 Visual Perception
Fall. 4 credits. Limited to 20 students. Prerequisite: Psychology 205 or permission of instructor. Not offered 1992–93.
M W F 10:10–11. J. Cutting.
A detailed examination of theories and processes in visual perception. Topics will include the perception of color, form, and motion; perceptual constancies; adaptation; pattern perception; and photography, television, and film.]

[PSYCH 307 Chemosensory Perception
Fall. 3 or 4 credits; the optional (or fourth) credit is for an independent laboratory project. Registration for the 4-credit option requires permission of the instructor; students will read, analyze, and discuss difficult original literature in the areas covered. Offered alternate years. Graduate students, see Psychology 607. Not offered 1992–93.
T R 9:05. B. P. Halpern.
An examination of basic theory, data, and processes for perception of the chemosensory environment. After a very brief (about two weeks) lecture survey of the anatomy and physiology of human taste and olfaction, the remainder of the course uses the Socratic method, in which the instructor asks questions of the students, to cover topics such as chemosensory psychophysics, saliva, chemosensory bases for the tastes of foods, taste-smell interactions, chemosensory function in neonates and in the aged, temporal aspects of tasting, sweetness, effects of pollution of the chemosensory environment, and interactions between body state and chemosensory stimuli. At the level of *Clinical Measurement of Taste and Smell*, edited by H. L. Meiselman and R. S. Rivlin; *Sensory Science Theory and Applications in Foods*, edited by H. T. Lawless and B. Klein; *Sensory Analysis of Foods*, 2nd edition, edited by J. R. Piggott.]

[PSYCH 308 Perceptual Learning
Fall. 3 credits. Prerequisite: Psychology 205, 209, or 305, or permission of instructor. Not offered 1992–93.]

[PSYCH 309 Development of Perception and Representation
Fall. 3 credits. Prerequisite: Psychology 205, 209, 214, or 305, or permission of instructor. Graduate students, see Psychology 609. Not offered 1992–93.
T R 1:25–2:40. E. Spelke.
An introduction to theories and research on the origins and development of knowledge of the immediately surrounding world. The course focuses on knowledge of the world as an arrangement in space and time, knowledge of the world as a space that can be encountered through multiple sensory modes, knowledge of the world as a place that can be acted upon, and organization of the world into meaningful objects and events.]

PSYCH 311 Introduction to Human Learning and Memory
Fall. 3 credits. Limited to 40 students. Some familiarity with statistical methods and experimental design and with the study of cognition is desirable.
M W F 10:10–11:00. B. Khurana.
This course offers an overview of experimental findings and theoretical issues in the study of human learning and memory. Coverage includes topics such as the nature of memory, various memory systems, coding and retrieval processes, practice and habit acquisition, organization for learning and memory, interference and forgetting, models of learning and memory, memory dysfunction and its relation to normal memory.

[PSYCH 313 Perceptual and Cognitive Processes
Spring. 4 credits. Prerequisite: Psychology 205 or 214 or permission of instructor. Not offered 1992–93. Graduate students, see Psychology 713.
R 1:25–4:25. Staff.]

[PSYCH 314 The Social Psychology of Language
Spring. 4 credits. Prerequisite: a course in psycholinguistics or social or personality psychology, or permission of instructor. Not offered 1992–93.
T R 2:55–4:10. Staff.]

PSYCH 316 Auditory Perception
Spring. 3 or 4 credits; the 4-credit option involves a laboratory project or paper. Prerequisite: Psychology 205, 209, 214, or 215 (other psychology, linguistics, or biology courses could serve as prerequisite with permission of the instructor). Limited to 30 students.
T R 10:10–11:25. C. Krumhansl.
Basic approaches to the perception of auditory information, with special consideration of complex patterns such as speech, music, and environmental sounds.

PSYCH 322 Hormones and Behavior (also Biological Sciences 322)
Spring. 3 or 4 credits; the 4-credit option involves a one-hour section once a week, in which students will be expected to participate in discussion and read original papers in the field. Limited to juniors and seniors; open to sophomores only by permission. Prerequisites: one year of introductory biology plus a course in psychology or Biological Sciences 221 or 222. S-U grades optional. Graduate students, see Psychology 722.
T R 10:10–11:25. D. Gudermuth.
The relationship between endocrine and neuroendocrine systems and the behavior of animals, including humans. Major emphasis is on sexual, parental, and aggressive behavior.

PSYCH 324 Biopsychology Laboratory (also Biological Sciences 324)
Fall. 4 credits. Limited to 20 juniors and seniors. Prerequisites: Psychology 123 or Biological Sciences 221 or 222, and permission of instructor.
T R 1:25–4:25. T. DeVoogd.
Experiments designed to provide research experience in animal behavior (including learning) and its neural and hormonal mechanisms. A variety of techniques, species, and behavior patterns are included.

[PSYCH 326 Evolution of Human Behavior
Fall. 4 credits. Prerequisite: Psychology 123, or an introductory biology course, or an introductory anthropology course. Graduate students, see Psychology 626. Not offered 1992–93.
T R 2:55–4:10. R. E. Johnston.
A broad comparative approach to the behavior of animals and humans with special emphasis on the evolution of human behavior. Topics covered will vary but will include some of the following: human evolution, evolutionary and sociobiological theory, animal communication, non-verbal communication, language, cognitive capacities, social behavior and organization, cooperation and altruism, sexual behavior, mating and marriage systems, aggression, warfare.]

PSYCH 327 Fieldwork in Psychopathology and the Helping Relationship
Fall, spring. 4 credits. Prerequisites: Psychology 225, HDFS 370 or concurrent registration in 225 or HDFS 370 and permission of instructor. S-U grades only. Students do not enroll in advance for this course. Field

placement assignments are made during the first two weeks of the semester. Students who have already taken Psychology 225 or HDFS 370 must contact the instructor during the first week of the semester. Enrollment is limited by the fieldwork placements available. Fee, $25 each semester.

T R 12:20. K. Keil.

This is a year-long lecture and discussion course. The year-long commitment is mandatory. Psychology 328 will be for students taking the course a second time. An "R" grade will be assigned in the fall semester, and a S-U grade will only be assigned in the spring semester. An introductory fieldwork course for students currently enrolled in or who have taken Psychology 225 or HDFS 370. Fieldwork placements include the school system, psychiatric institutions, halfway houses, and other mental health oriented facilities. In addition to fieldwork, weekly supervisory/seminar meetings are held to discuss fieldwork issues and assigned readings.

PSYCH 328 Continuing Fieldwork in Psychopathology and the Helping Relationship

Fall, spring. 4 credits. Prerequisites: Psychology 225, 327, or HDFS 370 and permission of instructor. S-U grades only. May not be taken more than twice. Students do not enroll in advance for this course. Fee, $25 each semester.

T R 12:20. K. Keil and staff.

Designed to allow students who have done fieldwork as part of Psychology 327 to continue their field placements or begin new field placements under supervision for academic credit. An "R" grade will be assigned in the fall semester, and a S-U grade will only be assigned in the spring semester.

PSYCH 332 Biopsychology of Learning and Memory (also Biological Sciences 328)

Spring. 3 credits. Prerequisites: one year of biology and either a biopsychology class or Biological Sciences 222.

M W F 11:15. T. DeVoogd.

This course will survey the approaches that have been or are currently being used in order to understand the biological bases for learning and memory. Topics will include invertebrate, "simple system" approaches, imprinting, avian song learning, hippocampal and cerebellar function, and human pathology. Many of the readings will be from primary literature.

PSYCH 342 Human Perception: Applications to Computer Graphics, Art and Visual Display

Fall. 3 credits. Prerequisite: Psychology 101 or permission of instructor. Psychology 205 strongly recommended. Graduate students, see Psychology 642.

T R 11:40–12:55. D. Field.

Our present technology allows us to transmit and display information over a variety of media. To make the most of these media, it is important to consider the limitations and abilities of the human observer. The course will consider a number of applied aspects of human perception with an emphasis on the display of visual information. Topics to be covered include: "Three-dimensional" display systems, color theory, spatial and temporal limitations of the visual systems, attempts at subliminal communication, and "visual" effects in film and television.

PSYCH 347 Psychology of Visual Communications

Spring. 4 credits. Limited to 12 students. Prerequisites: Psychology 101 and permission of instructor.

R 10:10–12:05; lab to be arranged.

J. B. Maas.

An exploration of theories of perception, attitude, and behavior change as they relate to the effectiveness of visually based communication systems. Emphasis is on an empirical examination of the factors that determine the nature and effectiveness of pictorial representations of educational messages in non-print media.

PSYCH 350 Statistics and Research Design

Fall. 4 credits. Prerequisite: a course in the behavioral sciences.

M W F 2:30–3:20. T. D. Gilovich.

Acquaints the student with the elements of statistical description (measures of average, variation, correlation, etc.) and develops an understanding of statistical inference. Emphasis is placed on those statistical methods of principal relevance to psychology and related social sciences.

PSYCH 361 Biopsychology of Normal and Abnormal Behavior (also Nutritional Sciences 361)

Fall. 3 credits. Prerequisites: an introductory Biological Sciences course, an introductory psychology course, or permission of instructor. S-U grades optional. Juniors and seniors only.

M W F 9:05. B. Strupp.

A critical evaluation of factors thought to underlie normal and abnormal behavior and/or cognitive functioning. Psychological, biological, and societal influences will be integrated. Topics include: (1) psychiatric disorders (e.g., depression, schizophrenia, eating disorders); (2) the psychobiology of learning, memory, and intelligence; (3) nutritional influences on behavior (sugar, food additives, malnutrition, dieting); (4) cognitive dysfunction (e.g., amnesia, Alzheimer's disease); (5) psychoactive drugs (e.g., hallucinogens, stimulants), and (6) developmental exposure to environmental toxins and drugs of abuse.

[PSYCH 370 Language and Cognition (also Linguistics 370)

Spring. 4 credits. Prerequisites: Linguistics 101 or 264, or Psychology 215, or permission of one of the instructors. Graduate students, see Psychology 670. Not offered 1992–93.

T R 1:25–2:40. J. Bowers.

Examination of current research on selected topics in language from both linguistic and psychological perspectives. Topics may include: universal grammar and language acquisition, syntactic parsing, word recognition, sentence production, aphasia, and schizophrenic language.]

[PSYCH 375 Developmental Psychobiology: Motivational Processes (also Nutritional Sciences 375)

Spring. 3 credits. Prerequisite: Psychology 276 or Nutritional Sciences 276. Graduate students, see Psychology 675/Nutritional Sciences 675. Not offered 1992–93.

T R 10:10–11:25. E. Blass.

This course focuses on maturational and experiential influences on motivational processes in animals and humans. Emphasis is placed on the mechanisms underlying mother-infant interactions, and the development of feeding, drinking, and reproduction behaviors.]

[PSYCH 379 Social Cognition

Spring. 4 credits. Prerequisite: one course in social or cognitive psychology or permission of instructor. Not offered 1992–93.

T R 10:10–11:25. Staff.]

PSYCH 380 Community Mental Health (also Human Development and Family Studies 380)

Summer only. 3 or 4 credits (4-credit option involves term paper).

M–F 9:30–12. Staff.

Basic concepts in the field of community mental health. Social models of mental illness, epidemiology, the role of culture and social class in mental illness, public attitudes, and civil liberties.

[PSYCH 383 Social Interaction (also Sociology 383)

Spring. 4 credits. Prerequisite: a course in social psychology. Not offered 1992–93.

M W 2:30–4:25. D. Hayes.]

[PSYCH 389 Reading Freud: Race, Gender, and Psychoanalysis (also Comparative Literature 347, English 347, German Studies 347)

Spring. 3 credits. Not offered 1992–93.

M 1:25–3:20. S. L. Gilman.

This course will read a series of texts from the formative works of Sigmund Freud (beginning with the *Studies in Hysteria* and concluding with *Moses and Monotheism).* These readings will be placed within the tension existing at the turn of the century between concepts of the biology of race and biology of gender. Close attention will be paid to the cultural, scientific, as well as polemical literature on the ideas of race and gender from the biological writings of the late nineteenth century. The course will also provide an introduction to the basic concepts of Freudian psychoanalytic theory. All of the primary readings are available in English.]

[PSYCH 396 Introduction to Sensory Systems (also Biological Sciences 396)

Spring. 3 or 4 credits (4 credits with term paper). Registration for the 4-credit option requires permission of instructor. Prerequisites: an introductory course in biology or biopsychology, plus a second course in neurobiology or behavior or perception or cognition or biopsychology. Students will be expected to have elementary knowledge of perception, neurophysiology, behavior, and chemistry. No auditors. Offered alternate years. Graduate students, see Psychology 696. Not offered 1992–93.

M W F 9:05. B. P. Halpern.

The course will be taught using the Socratic method, in which the instructor asks questions of the students. Students read, analyze, and discuss in class difficult original literature dealing with both those characteristics of sensory systems that are common across living organisms and those sensory properties which represent adaptations of animals to particular habitats or environments. The principles and limitations of major methods used to examine sensory systems will be considered. General principles of sensory systems, and auditory, visual, and somesthetic systems are covered.

One aspect of each system (e.g., localization of objects in space by sound, color vision, thermoreception) will be selected for special attention. At the level of *An Introduction to the Physiology of Hearing, 2nd edition* by J. O. Pickles; *Hearing: Physiological Acoustics, Neural Coding, and Psychoacoustics*, by W. L. Gulick, G. A. Gescheider, and R. D. Frisina; *The Retina: An Approachable Part of the Brain*, by J. E. Dowling; *Handbook of Physiology—The Nervous System. III. Sensory Processes*, edited by J. M. Brookhard and V. B. Mountcastle.]

PSYCH 402 Current Research on Psychopathology: Depression
Spring. 4 credits. Limited to 20 students. Prerequisite: Psychology 225 or HDFS 270.
W 1:25–4:25. K. Keil.
Current research and theory on the nature and etiology of depression. Approaches from various perspectives (biological, psychological, socio-cultural) are considered. Minimal attention to psychotherapy and symptomatology.

[PSYCH 404 Psychopathology and the Family
Spring. 4 credits. Limited to 20 students. Prerequisite: Psychology 225 or HDFS 270. Not offered 1992–93.
W 1:25–4:25. K. Keil.
This course will explore familial influences on the development of abnormal behavior. It will examine how psychological, biological, and cultural factors in a family might contribute to such disorders as anorexia nervosa, depression, sexual abuse, psychopathy, and psychosomatic illnesses. Emphasis will be placed on early childhood experiences in the family and their impact on the development of later psychopathology. The course will also discuss how the evolution of family structures in more recent times (e.g., the rise in day care and divorce) influences the individual. Family therapy approaches and techniques will also be examined.]

PSYCH 410 Undergraduate Seminar in Psychology
Fall or spring. 2 credits. Written permission of section instructor required for registration. Nonmajors may be admitted, but psychology majors are given priority.
Hours to be arranged. Staff.
Information on specific sections for each term, including instructor, prerequisites, and time and place, may be obtained from the Department of Psychology office, 211 Uris Hall.

PSYCH 412 Human Experimental Psychology Laboratory
Spring. 4 credits. Limited to 20 students. Prerequisite: permission of instructor. Recommended, some experience in programming and one course in experimental psychology. Graduate students, see Psychology 612.
T R 11:40–12:55. D. Field.
A laboratory course using current methods in experimentation in perception and cognitive psychology. Students will attempt to replicate several classic experiments and also develop one independent project. Computers will be available and used in most of the experiments. Projects will be selected from the areas of visual perception, pattern recognition, memory, language and concept learning.

[PSYCH 414 Comparative Cognition (also Psychology 714)
Spring. 3 credits. Prerequisites: Psychology 205, 209, 214, or permission of instructor. Graduate students, see Psychology 714. Not offered 1992–93.
T R 1:25–2:40. E. Spelke.
Studies of animal behavior, human development, and human pathology may shed light on the nature of knowledge and reasoning. This seminar will focus on knowledge and reasoning about space, time, number, physical objects, and persons. Questions will include: (1) How do such comparative studies of cognitive abilities vary across species: Are there ways of reasoning that are distinctly human? (2) Do humans and/or other animals reason in the same way about entities in different domains (e.g., numbers, physical objects, and persons)? (3) How do knowledge and reasoning change throughout human development: Is knowledge enriched, or more radically restructured, as children grow and gain experience?]

[PSYCH 415 Concepts, Categories, and Word Meanings
Fall. 4 credits. Prerequisites: Psychology 205, 209, 214, or 215, or permission of instructor. Graduate students, see Psychology 615. Not offered 1992–93.
T 1:25–4:25. F. Keil.
A consideration of what types of categories are psychologically important, of how they are represented and used through concepts, and of how concept structure and semantic structure are interrelated. Different models of concept structure and categorization processes are evaluated, as are models of conceptual change and concept acquisition. Other topics include: relations between concepts and broader knowledge representation systems such as scripts, mental models, and intuitive theories; relative roles of associative information and beliefs in concept structure; categorization in other species; neuropsychological studies of categorization; comparisons of categorization systems across cultures; and comparisons of concept structures across different types of categories.]

[PSYCH 416 Psychology of Language
Spring. 4 credits. Prerequisite: some background in psycholinguistics or linguistics. Graduate students, see Psychology 616. Not offered 1992–93.
T R 1:25–2:40. Staff.
Each year the course focuses on one or two major theoretical issues in current psycholinguistics. An intensive critical examination is made of the relevant literature from psychology, linguistics, and artificial intelligence. The issues are considered not only at the detailed level of specific hypotheses and evidence but also in relation to broader theoretical trends in the field.]

PSYCH 417 The Origins of Thought and Knowledge
Fall. 4 credits. Prerequisites: Psychology 205, 209, 214, or 215, or permission of instructor. Graduate students, see Psychology 717.
T 1:25–4:25. F. Keil.
An in-depth analysis of current theories concerning the growth of thought and knowledge in childhood. Several controversies will be discussed in detail, including: Are mental abilities organized in local domains or modules that have their own patterns of development, or is cognitive development a more general process? Do comparative studies with other species and evolutionary models provide any useful insights into cognitive development in humans? Are there qualitative restructurings of thought and knowledge with development, or is the process more continuous in nature? What restrictions should these developmental considerations place on models of thought and knowledge in adults?

PSYCH 418 Psychology of Music
Fall. 3 or 4 credits, depending on whether student elects to do an independent project. Prerequisites: junior or senior standing with major in psychology or music and some background in both, or permission of instructor. Graduate students, see Psychology 618.
T R 10:10–11:25. C. Krumhansl.
Detailed analysis of topics in the psychology of music, including theories of consonance, perception of tonal-harmonic structure, memory for music, and effects of musical training. Emphasis given to experimental methodologies.

PSYCH 422 Developmental Biopsychology
Fall. 4 credits. Prerequisites: a course in introductory biology and a course in biopsychology or neurobiology (such as Psychology 123 or Biological Sciences 221). Graduate students, see Psychology 622.
M W 2:30–4:25. B. L. Finlay.
We will discuss the relationship of the development and evolution of the brain to the development of behavior. Topics include how neurons are generated, find targets, and establish connections; the emergence of reflexive and complex behavior; how experience affects the developing brain; evolutionary perspectives on the development of perception, memory, and communication systems; and abnormal development.

[PSYCH 424 Neuroethology (also Biological Sciences 424)
Fall. 3 credits. Prerequisites: Biological Sciences 221 and 222. S–U grades optional for graduate students only. Offered alternate years. Not offered 1992–93.
M W F 11:15–12:05. T. DeVoogd.
The integrated study of neurobiology and animal behavior. Representative topics include acoustic communication in insects and amphibians, vocal mechanisms and plasticity of bird song, mammalian hearing, bat echolocation, prey detection by owls, electroproduction and electroreception in fish, neurophysiology and behavior of pheromone communication, neurobehavior of vision in anurans, mammalian visual processing, command neurons and decision networks, locomotion and motor-pattern generation, escape behavior in invertebrates, and neutral correlates of learning. Assigned readings include original articles in the scientific literature. A term paper on the neural basis of animal behavior is required.]

[PSYCH 425 Brain and Behavior
Fall. 3 or 4 credits (4-credit option includes a discussion section and requires an additional paper). Prerequisites: a course in introductory biology and a course in biopsychology or neurobiology (such as Psychology 123 or Biological Sciences 221). Graduate students, see Psychology 625. Not offered 1992–93.
M W 2:30–4:25. B. L. Finlay.
We will study the relation between structure and function in the central nervous system. The importance of evolutionary and mechanistic approaches for understanding the

human nervous system will be stressed. Some topics to be discussed include visual and somatosensory perception, organization of motor activity, emotion and motivation, psychosurgery, and memory and language.]

[PSYCH 426 Seminar and Practicum in Psychopathology
Spring. 4 credits. Limited to 16 students. Prerequisite: Psychology 225; permission of instructor required in all cases. Student should apply to the course during preregistration in the fall semester; acceptance will be announced before the end of the fall semester. Not offered 1992–93.
T R 2:30–4:25. R. D. Mack.]

[PSYCH 429 Olfaction and Taste: Structure and Function (also Biological Sciences 429)
Fall. 3 or 4 credits (4-credit option requires a term paper or research project. The research project can, but does not need to, study nonhuman vertebrates). Preference given to junior and senior psychology and biology majors and graduate students. Prerequisite: one 300-level course in biopsychology or equivalent. Graduate students, see Psychology 629. Not offered 1992–93.
T R 9:05. B. P. Halpern.
The structural and functional characteristics of olfaction and taste will be explored by reading and discussing current literature in these areas. Structure will be examined at the light levels of electron microscopes as well as at the molecular level. Function will be primarily neurophysiological and biochemical aspects. The emphasis will be on vertebrates, especially air-breathing vertebrates in the case of olfaction, but there will be some coverage of invertebrate forms. At the level of *Smell and Taste in Health and Disease*, edited by T. V. Getchell, R. L. Doty, L. M. Bartoshuk, and J. B. Snow; *The Neurobiology of Taste and Smell*, edited by T. E. Finger and W. L. Silver.]

PSYCH 436 Language Development (also Human Development and Family Studies 436 and Linguistics 436)
Spring. 4 credits. Prerequisite: at least one course in developmental psychology, cognitive psychology, cognitive development, or linguistics. Open to undergraduates and graduate students. S-U grades optional. Offered alternate years.
T R 3:10–4:25. B. Lust.
This course surveys basic issues, methods, and research in the study of first-language acquisition. Major theoretical positions in the field are considered in the light of experimental studies in first-language acquisition of phonology, syntax, and semantics from infancy on. The fundamental linguistic issues of universal grammar and the biological foundations for acquisition are discussed, as are the issues of relations between language and thought. The acquisition of communication systems in nonhuman species such as chimpanzees is addressed, but major emphasis is on the child.

PSYCH 440 Sleep and Dreaming
Spring. 4 credits. Prerequisites: junior or senior standing and at least Psychology 123 or Biological Sciences 221–222. A second course in biopsychology or neurobiology is recommended. S-U grades optional.
T R 11:40–12:55. H. Porte.
The first part of this course emphasizes the neurobiology of sleep. Topics include neural mechanisms of behavioral state change; the anatomy and physiology of the states and rhythms of sleep; theories of the evolution and plausible functions of sleep. Students will keep and analyze records of their own sleep patterns. The second part of the course emphasizes psychological experience in sleep. Topics include night terror and other experiences originating in non-REM sleep, and dreams originating in REM sleep. Students will examine the data of dreams—including their own—in light of what they have learned about the neurobiology of dreaming sleep. They will evaluate dream theories from Freud's to Francis Crick's, and will consider whether dreaming is meaningful or meaningless, encrypted or transparent, better remembered or better forgotten.

PSYCH 441 Laboratory in Sleep and Dreaming
Fall. 4 credits. Prerequisites: Psychology 440 or comparable preparation, and permission of the instructor during preregistration. Laboratory fee: $35.
T R 1:25–2:40. H. Porte.
Emphasizing the neurobiology of sleep state, the course introduces the laboratory study of human sleep and dreaming. Serving as both experimenter and subject, each student will learn the rationale and techniques of electroencephalography and other bioelectric measures of behavioral state. Using computerized data analysis, students will complete weekly laboratory reports and a collaborative term project. Sleep recordings will be done during the day or evening when possible. Occasional all-night recording sessions are required.

PSYCH 450 The Lenses of Gender (also Women's Studies 450, Psychology 650, and Women's Studies 650)
Fall. 4 credits. Permission of instructor. Limited to 12 seniors and graduate students. No preregistration; interested students should attend the first class session. Graduate students, see Psychology/Women's Studies 650.
W 2:30–4:30. S. Bem.
This seminar analyzes the ideological, institutional, and psychological mechanisms that are responsible for the social reproduction of male power in Western—and especially American—culture. It is very interdisciplinary, covering material from biology, history, anthropology, law, sociology, psychology, psychiatry, philosophy, and feminist theory. Part 1 analyzes three important organizing principles or "cultural lenses" that have come to be embedded in the social institutions and the cultural discourses of Western culture: (1) biological essentialism; (b) androcentrism; and (c) gender polarization (including the stigmatizing of homosexuality). Part 2 analyzes how the individuals living within the context of these lenses are transformed from being male or female newborns to being "masculine" and "feminine" adults—how, in other words, the culture's gender lenses are subtly transferred from the practices of the culture to the psyche of the individual. Part 3 considers possibilities for social and personal change.

[PSYCH 465 Mathematical Psychology
Spring. 4 credits. Prerequisites: one year of college mathematics (finite mathematics or calculus), a course in probability or statistics, and a course in psychology. Not offered 1992–93.
T R 10:10–11:40. Staff.]

PSYCH 467 Seminar: The Examined Self—A Psychohistorical View
Spring. 4 credits. Prerequisites: 9 credits of psychology including Psychology 225 or equivalent, and permission of instructor before course enrollment.
T 2:30–4:25. H. M. Feinstein.
Based primarily on American autobiographies dating from the seventeenth century to the twentieth century, this seminar will explore the shifting interface between self and historical context. Students should be prepared to write and talk about their own lives as well as the historical figures selected for study.

[PSYCH 468 American Madness
Spring. 4 credits. Limited to 15 students. Prerequisites: Psychology 225 and permission of instructor. Not offered 1992–93.
T 2:30–4:25. H. M. Feinstein.
The seminar will be devoted to an analysis of insanity as a psychological and historical phenomenon. Selected writings by the mentally ill and their definers will be studied.]

[PSYCH 469 Psychotherapy: Its Nature and Influence
Spring. 4 credits. Limited to senior psychology majors. Prerequisites: Psychology 225 or equivalent and permission of instructor during preregistration. Not offered 1992–93.
W 7–10 p.m. R. D. Mack.
A seminar on the nature of psychotherapy. Issues related to therapeutic goals, differing views of the nature of man, ethical concerns, and research problems are also considered. Experiential and role-playing exercises in class and three hours per week of peer counseling outside of class are integral parts of the seminar experience.]

PSYCH 470 Undergraduate Research in Psychology
Fall or spring. 1–4 credits. S-U grades optional. Written permission from the staff member who will supervise the work and assign the grade must be included with the course enrollment material. Students should enroll in the section listed for that staff member. A section list is available from the Department of Psychology.
Hours to be arranged. Staff.
Practice in planning, conducting, and reporting independent laboratory, field, and/or library research.

PSYCH 471 Advanced Undergraduate Research in Psychology
Fall or spring. 1-4 credits. S-U grades optional. Written permission of the staff member who will supervise the work and assign the grade must be included with the course enrollment material. Students should enroll in the section listed for that staff member. A section list is available from the Department of Psychology.
Hours to be arranged. Staff.
Advanced experience in planning, conducting, and reporting independent laboratory, field, and/or library research. One, and preferably two, semesters of Psychology 470 is required. The research should be more independent and/or involve more demanding technical skills than that carried out in Psychology 470.

PSYCH 472 Multiple Regression
Spring, weeks 1–7. 2 credits. Prerequisite: one solid semester of introductory statistics. Analysis of variance is helpful but not required.
M W F 10:10. R. Darlington.

Uses and pitfalls of multiple regression in causal analysis, path analysis, and prediction. Emphasis on analyzing data collected under uncontrolled conditions. Includes colinearity, indicator variables, sets, adjusted and shrunken R^2, suppressors, hierarchical analysis, overcontrol, experimental design. Very little hand computation; uses MYSTAT computer program.

PSYCH 473 General Linear Model
Spring, weeks 8–14. 2 credits. Prerequisite: Psychology 472 or equivalent.
M W F 10:10. R. Darlington.
Includes multicategorical variables, corrections for multiple tests, diagnostic methods, nonlinear relationships, interaction, main and simple effects, and basic power analysis. Emphasizes MYSTAT and SYSTAT, briefly discusses SAS PROC REG and SAS PROC GLM.

[PSYCH 475 Multivariate Analysis of Psychological Data
Fall. 2 credits. Prerequisite: Psychology 473 or permission of instructor. Not offered 1992–93.
R 10:10–12:05. R. Darlington.
Students vote on topics to cover, choosing among cluster analysis, multidimensional scaling, component analysis, factor analysis, MANOVA, canonical correlation, repeated measures, logistic regression, log-linear models, corrections for unreliability in regression, nesting, power analysis, influence analysis, and other topics. First class sketches all these topics before vote.

[PSYCH 476 Representation of Structure in Data
Fall. 3 credits. Prerequisites: one year of college mathematics (finite mathematics or calculus) and a course in the social sciences. Not offered 1992–93.
W 2:30–4:30. Staff.]

PSYCH 478 Psychometric Theory
Fall. 2 credits. Prerequisite: Psychology 472 or permission of instructor.
M 2:30–4:25. R. Darlington.
Statistical methods relevant to the use, construction, and evaluation of psychological tests.

[PSYCH 479 Multisample Secondary Analysis
Fall, weeks 11–14. 1 credit. Prerequisite: Psychology 350 or equivalent. Not offered 1992–93.
T R 10:10–12:05. R. Darlington.
Statistical methods for analyzing and integrating the results of many independent studies on related topics.]

PSYCH 481 Advanced Social Psychology
Fall. 4 credits. Limited to 20 students. Prerequisite: a course in social psychology or permission of instructor.
T R 10:10–11:25. D. T. Regan.
Selected topics in social psychology are examined in depth with an emphasis on the relationship between experimental research and the development of theory. Readings will be mostly primary sources. Among the theoretical approaches to social behavior we may discuss are social comparison theory, cognitive dissonance, attribution processes and social judgment, social exchange theory, dramaturgy and impression management, and biological perspectives.

[PSYCH 482 Death and Dying
Spring. 4 credits. Limited to 20 juniors and seniors. Prerequisites: 6 credits in sociology or psychology. Not offered 1992–93.
T R 2:30–4:25. Staff.
Issues of death and dying in modern American society are explored from the perspectives of psychology, sociology, and the health-related professions. Possible inadequacies in current practice are examined and alternatives discussed.]

[PSYCH 488 Human Development in Context (also Human Development and Family Studies 488)
Spring. 4 credits. Open to juniors, seniors, and graduate students. Prerequisites: one course in statistics (which may be taken simultaneously) and two courses in the social sciences, or one in human biology and one in the social sciences. Not offered 1992–93.
T R 2:30–4:25. Staff.]

PSYCH 489 Seminar: Selected Topics in Social Psychology and Personality (also Sociology 489)
Spring. 3 credits. Prerequisites: one course in psychology or one course in sociology or permission of instructor. Graduate students, see Psychology 689.
Hours to be arranged. D. Bem.
The specific topics of discussion vary, but the general emphasis is on a critical examination of the study of individuals in social contexts.

[PSYCH 490 History and Systems of Psychology
Fall. 4 credits. Intended for juniors, seniors, and graduate students, majors and nonmajors. Prerequisites: at least three courses in psychology or related fields or permission of instructor. Not offered 1992–93.
W 2–4:30. Staff.]

PSYCH 491 Research Methods in Psychology
Spring. 4 credits. Enrollment limited to 25 students. Recommended: permission of instructor, Psychology 350, experience in upper-division psychology courses, or graduate standing. Graduate students, see Psychology 691.
T R 10:10–11:25. D. Dunning.
An intensive examination of the basic research methods used in social, personality, cognitive, and developmental psychology. The course will focus on designing and conducting experiments, i.e., how to turn vague theories into concrete and testable notions, evaluate studies, avoid common pitfalls, and, finally, remain ethical. Beyond learning methods of "correct" and rigorous experimentation, we will also discuss what makes a research study actually interesting. The course will, in addition, cover test construction, survey methods, and "quasi experiments." Students will concentrate on completing a small research project in which they conduct an experiment, interpret its data, and write up the results.

PSYCH 492 Sensory Function (also Biological Sciences 492)
Spring. 4 credits. Prerequisite: a 300-level course in biopsychology, or Biological Sciences 222 or 311, or permission of the instructors. Students are expected to have a knowledge of elementary physics, chemistry, and behavior. S-U grades optional. Offered alternate years. Graduate students, see Psychology 692.
M W F 10:10; sec, hours to be arranged.
H. C. Howland, B. P. Halpern.
This course covers classical topics in sensory function such as vision, hearing, touch and balance, as well as some more modern topics like sensory coding, location of stimulus sources in space, and the development of sensory systems. Both human and nonhuman systems are discussed. In all cases the chemical, physical, and neurophysiological bases of sensory information are treated, and the processing of this information is followed into the central nervous system. At the level of *The Senses*, edited by Barlow and Mollon, and *An Introduction to the Physiology of Hearing*, 2nd edition, by Pickles.

Advanced Courses and Seminars

Advanced seminars are primarily for graduate students, but with the permission of the instructor they may be taken by qualified undergraduates. The selection of seminars to be offered each term is determined by the needs of the students.

A supplement describing these advanced seminars is available at the beginning of each semester and can be obtained from the department office. The following courses may be offered either term and carry 4 credits unless otherwise indicated.

PSYCH 502 Professional Writing in Psychology

PSYCH 510–511 Perception

PSYCH 512–514 Visual Perception

PSYCH 513 Learning

PSYCH 515 Motivation

PSYCH 517 Language and Thinking

PSYCH 518 Psycholinguistics

PSYCH 519–520 Cognition

PSYCH 521 Psychobiology

PSYCH 522 Topics in Perception and Cognition

PSYCH 523 Physiological Psychology

PSYCH 524 Sex Differences in Brain and Behavior (also Biological Sciences 626)
Spring. 2 credits. Limited to 12 seniors and graduate students.
Hours to be arranged. T. DeVoogd.
A survey of the newly discovered animal models for sex differences in the brain. Topics include the role of steroids in brain development, whether hormones can modify the structure of the adult brain, and the consequences of such sex differences in anatomy for behavior.

PSYCH 525 Mathematical Psychology

PSYCH 531 History of Psychology

PSYCH 535 Animal Behavior

PSYCH 541 Statistical Methods

PSYCH 543 Psychological Tests

PSYCH 544 Topics in Psychopathology and Personality

PSYCH 545 Methods in Social Psychology

PSYCH 547 Methods of Child Study

PSYCH 551 Distinguished Speakers

PSYCH 561 Human Development and Behavior

PSYCH 580 Experimental Social Psychology (also Sociology 580)

PSYCH 591 Educational Psychology

PSYCH 595 Teaching of Psychology

PSYCH 596 Improvement of College Teaching

PSYCH 600 General Research Seminar
Fall or spring. No credit.

PSYCH 605 Perception (also Psychology 205)
Spring. 4 credits.
T R 2:55–4:10. Staff.

[PSYCH 607 Chemosensory Perception (also Psychology 307)
Fall. 4 credits. Not offered 1992–93.
T R 9:05. B. P. Halpern.]

[PSYCH 609 Development of Perception (also Psychology 309)
Fall. 4 credits. Not offered 1992–93.
T R 1:25–2:40. E. S. Spelke.]

PSYCH 612 Human Experimental Psychology Laboratory (also Psychology 412)
Spring. 4 credits.
T R 11:40–12:55. D. Field.

[PSYCH 613 Obesity and the Regulation of Body Weight (also Nutritional Sciences 315)
Spring. 3 credits. Limited to 30 students. Prerequisites: one course in psychology and one course in nutrition. Undergraduate students may register with permission of instructor. S-U grades optional. Offered alternate years. Not offered 1992–93.
T R 1:30–3. D. Levitsky.
This course is a multidisciplinary discussion of the causes, effects, and treatments of human obesity. Topics include the biopsychology of eating behavior, the genetics of obesity, the role of activity and energy metabolism, psychosocial determinants of obesity, anorexia nervosa, therapy and its effectiveness, and social discrimination.]

PSYCH 614 Introduction to Cognitive Psychology (also Psychology 214)
Spring. 4 credits.
M W F 1:25–2:15. B. Khurana.

[PSYCH 615 Concepts, Categories, and Word Meaning (also Psychology 415)
Fall. 4 credits. Not offered 1992–93.
T 1:25–4:25. F. Keil.]

[PSYCH 616 Psychology of Language (also Psychology 416)
Spring. 4 credits. Not offered 1992–93.
T R 1:25–2:40. Staff.]

PSYCH 618 Psychology of Music (also Psychology 418)
Fall. 4 credits.
T R 10:10–11:25. C. Krumhansl.

PSYCH 622 Developmental Biopsychology (also Psychology 422)
Fall. 4 credits.
M W 2:30–4:25. B. L. Finlay.

[PSYCH 625 Brain and Behavior (also Psychology 425)
Fall. 4 credits. Not offered 1992–93.
M W 2:30–4:25. B. L. Finlay.]

[PSYCH 626 Evolution of Human Behavior (also Psychology 326)
Fall. 4 credits. Not offered 1992–93.
T R 2:55–4:10. R. Johnston.]

[PSYCH 629 Olfaction and Taste: Structure and Function (also Psychology 429 and Biological Sciences 429)
Fall. 4 credits. Not offered 1992–93.
T R 9:05. B. P. Halpern.]

PSYCH 650 The Lenses of Gender (also Psychology 450 and Women's Studies 450 and Women's Studies 650)
Fall. 4 credits.
W 2:30–4:30. S. Bem.

[PSYCH 670 Language and Cognition (also Psychology 370 and Linguistics 370)
Spring. 4 credits. Not offered 1992–93.
T R 1:25–2:40. J. Bowers.]

[PSYCH 675 Developmental Psychobiology: Motivational Processes (also Psychology 375, Nutritional Sciences 375 and Nutritional Sciences 675)
Spring. 4 credits. Not offered 1992–93.
T R 10:10–11:25. E. Blass.]

[PSYCH 676 Motivation (also Psychology 276, Nutritional Sciences 276, and Nutritional Sciences 676).
Spring. 4 credits. Not offered 1992–93.
T R 10:10–11:25. E. Blass.]

PSYCH 683 Seminar in Interaction (also Sociology 683)

[PSYCH 685 Sex Differences and Sex Roles (also Sociology 685 and Women's Studies 685)
Not offered 1992–93.
Staff.]

PSYCH 689 Seminar: Selected Topics in Social Psychology and Personality (also Psychology 489 and Sociology 489)
Spring. 4 credits.
Hours to be arranged. D. Bem.

PSYCH 691 Research Methods in Psychology (also Psychology 491)
Spring. 4 credits.
T R 10:10–11:25. D. Dunning.

PSYCH 692 Sensory Function (also Psychology 492 and Biological Sciences 492)
Spring. 4 credits.
M W F 10:10. H. C. Howland, B. P. Halpern.

[PSYCH 696 Introduction to Sensory Systems (also Psychology 396 and Biological Sciences 396)
Spring. 4 credits. Not offered 1992–93.
M W F 9:05. B. P. Halpern.]

PSYCH 700 Research in Biopsychology

PSYCH 709 Developmental Psychology (also Psychology 209)
Spring. 4 credits.
T R 7:30–10:30 p.m. F. Keil.

PSYCH 710 Research in Human Experimental Psychology

[PSYCH 713 Perceptual and Cognitive Processes (also Psychology 313)
Spring. 4 credits. Not offered 1992–93.
R 1:25–4:25. Staff.]

[PSYCH 714 Comparative Cognition (also Psychology 414)
Spring. 4 credits. Not offered 1992–93.
T R 1:25–2:40. E. Spelke.]

PSYCH 715 Psycholinguistics (also Psychology 215)
Fall. 4 credits.
M W F 11:15–12:05. J. Sereno.

PSYCH 717 The Origins of Thought and Knowledge (also Psychology 417)
Fall. 4 credits.
T 1:25–4:25. F. Keil.

PSYCH 720 Research in Social Psychology and Personality

PSYCH 722 Hormones and Behavior (also Psychology 322 and Biological Sciences 322)
Spring. 4 credits.
T R 10:10–11:25. D. Gudermuth.

PSYCH 773 Proseminar in Cognitive Studies I (also Cognitive Studies 773, Philosophy 773, Linguistics 773, and Computer Science 773)
Fall. 2 credits.
R 1:25–2:40. Staff (taught jointly by faculty from Cornell's Cognitive Studies Program, representing fields of computer science, linguistics, psychology and philosophy).
This is the first term of a year-long lecture-and-discussion course that is intended to provide graduate students with an interdisciplinary introduction to the study of knowledge, its representation, acquisition, and use. Topics may include the psychology of perception and cognition; the philosophy of mind, language, and knowledge; the phonology, syntax, and semantics of natural language; computational approaches to natural language processing, vision and reasoning; parallel distributed processing, and neuropsychology.

PSYCH 774 Proseminar in Cognitive Studies II (also Cognitive Studies 774, Computer Science 774, Linguistics 774 and Philosophy 774)
Spring. 2 credits.
R 1:25–2:40. Staff (taught jointly by faculty from Cornell's Cognitive Studies Program, representing fields of computer science, linguistics, philosophy, and psychology.)
This is the second half of a year-long lecture-and-discussion course that is intended to provide graduate students with an interdisciplinary introduction to the study of knowledge, its representation, its acquisition, and its use. Topics may include the psychology of perception and cognition; the philosophy of mind, language, and knowledge; the phonology, syntax, and semantics of natural language; computational approaches to natural language processing, vision and reasoning; parallel distributed processing, and neuropsychology.

PSYCH 900 Doctoral Thesis Research in Biopsychology

PSYCH 910 Doctoral Thesis Research in Human Experimental Psychology

PSYCH 920 Doctoral Thesis Research in Social Psychology and Personality

Summer Session Courses

The following courses are also frequently offered in the summer session, though not necessarily by the same instructor as during the academic year. Not all of these courses

will be offered in a particular summer. Information regarding these courses and additional summer session offerings in psychology is available from the department before the end of the fall semester.

PSYCH 101 Introduction to Psychology: The Frontiers of Psychological Inquiry

PSYCH 123 Introduction to Biopsychology

PSYCH 128 Introduction to Psychology: Personality and Social Behavior

PSYCH 199 Sports Psychology

PSYCH 215 Psycholinguistics

PSYCH 265 Psychology and Law

PSYCH 280 Introduction to Social Psychology

PSYCH 281 Interpersonal Relations and Small Groups (also Sociology 281)

PSYCH 325 Introductory Psychopathology

PSYCH 350 Statistics and Research Design

PSYCH 380 Community Mental Health

PSYCH 469 Psychotherapy: Its Nature and Influence

Special Programs

The Department of Psychology, in conjunction with Human Service Studies, the Field Study Office of the College of Human Ecology, and the Tel-Aviv University School of Social Work will periodically offer an eight-week summer program in Community Health. The course will include three weeks at Cornell and five weeks in Israel. It may be taken for 10–12 credits. For further information, contact Ronald Mack in the Department of Psychology.

ROMANCE STUDIES

The Department of Romance Studies (Alice Colby-Hall, chair) offers courses in French literature, Italian literature, and Spanish literature. In addition, the department's program includes courses in the French and Spanish languages, French linguistics, semiotics, and in French, Italian, and Hispanic culture. Through its course offerings and opportunities for independent study, the department seeks to encourage study of the interactions of the Romance literatures among themselves, with other literatures, and with other fields of inquiry.

French

J. Béreaud , A. Berger, A. M. Colby-Hall, N. Furman (director of undergraduate studies), D. I. Grossvogel, R. Klein, P. Lewis, J. Ngate, K. Perry, D. Polachek, A. Seznec, S. Tarrow, L. R. Waugh.

The Major

The major in French is divided into three options: French area studies, French linguistics, and French literature. For a description of the linguistics option, see Modern Languages and Linguistics, French. The area studies and literature options are described below.

While prospective majors should try to plan their programs as far ahead as possible, especially if they intend to study abroad, no student will be refused admission merely because of a late start. Students wishing to major in French area studies or French literature options, should consult the director of undergraduate studies of the Department of Romance Studies, Professor Nelly Furman.

The Literature Option

The major in French, literature option, is designed to give students proficiency in the oral and written language, to acquaint them with French literature and culture, and to develop skills in literary analysis.

Admission

To be admitted to the major, students should have completed French Literature 221–222 (formerly 201–202) and French Language 203–213 (formerly 204) or their equivalents by the end of their sophomore year.

For completion of the major, a student must:

1) acquire a sound degree of competence in French language. This competence is demonstrated by the successful completion of French 311–312 (or their equivalents, such as properly accredited study abroad or the passing of a special language test, the CASE examination).

2) take six courses in French literature or civilization at the 300 level or above in addition to French 221–222. These courses, selected in consultation with the student's major adviser, will normally include at least one course from each of the three major periods of French literature: Medieval to Renaissance, the seventeenth and eighteenth centuries, and the nineteenth and twentieth centuries.

3) take two connected courses in one of the following related areas: (a) French literature or linguistics, (b) general linguistics, history of language, psycholinguistics, (c) courses in comparative literature, history, history of art, music, or government which have a significant French component. Students who are double majors are exempted from this last requirement.

The French Area Studies Option

Admission

To be admitted to the major, students should have completed French Literature 220 and French Language 203–213 (or their equivalents) by the end of their sophomore year.

For completion of the major, a student must:

(1) acquire a sound degree of competence in the French language. This competence is demonstrated by the successful completion of French 311–312 (or their equivalents, such as properly accredited study abroad or the passing of a special language test, the CASE examination).

(2) take two courses in Romance Studies (literature or civilization).

(3) take six courses (at least two of which must be at an advanced level) in areas of interest such as—but not limited to—Africana Studies, anthropology, comparative literature, economics, government, history, history of art, music, theater arts, women's studies.

Administration of French Area Studies

After being admitted to the major by the director of undergraduate studies of the Department of Romance Studies, students will have an adviser in Romance Studies and another faculty member from their main area of interest. These two faculty members will constitute the committee that will help students design an academically coherent program and will supervise their progress toward graduation. A copy of each student's individual program will be given to the director of undergraduate studies for approval and safekeeping.

Study Abroad in France

French majors or other interested students may study in France for one or two semesters during their junior year. Opting for one of several study-abroad plans recognized by the departments of Romance Studies and Modern Languages and Linguistics facilitates the transfer of credit. Information about these plans is available from the director of undergraduate studies.

Students interested in studying in France are encouraged to consider the special benefits offered by EDUCO, the program in Paris cosponsored by Cornell and by Duke University. EDUCO offers advanced students a challenging course of study and the experience of total immersion in French life and culture in Paris. Participants in this program spend the year or the semester as fully matriculated students at the University of Paris and other institutions of higher learning in Paris, including the Institut d'Etudes Politiques (Sciences Po), selecting courses in many fields from the regular university course offerings. Students begin the academic year with an intensive three-week orientation into French history, society, and daily life. While it is possible to enroll in the EDUCO Program for one semester, admission will be given first to students planning to study abroad for the full academic year.

EDUCO maintains a center in Paris with appropriate support staff. The resident director, chosen annually from the Cornell and Duke faculties, teaches a special seminar each semester, provides academic advice, and helps ensure the quality of the courses. The center, which includes a small library and word-processing facilities, is regularly used by students for special tutorials, seminars, and lectures, as well as informal gatherings.

Honors. The honors program encourages well-qualified students majoring in French literature or culture to do independent work in French outside the structure of courses. The preparation of the senior honors essay, generally spread over two terms, provides a unique learning opportunity, since it allows for wide reading, and extensive rewriting to a degree not possible in the case of course papers.

No special seminars or courses are required of honors students, but they will have regular meetings with the faculty advisers who have agreed to supervise their work. They may receive course credit by enrolling in French 429–430, but these independent study courses must be taken in addition to the courses that meet the minimum requirements for the major. At the end of the senior year each honors student is examined orally on the honors essay by a jury consisting of his or her faculty adviser and two other faculty members. The awarding of honors is determined by the student's grades in the major and the quality of the honors essay.

Fees. Depending on the course, a small fee may be charged for copies of texts used in course work.

Language and Linguistics

Most language courses and French linguistics courses are offered by Modern Languages and Linguistics. Further language courses (conversation and advanced level), French linguistics courses, and all literature courses are listed below.

Note: Students placed in the 200-level courses have the option of taking language and/or literature courses; see listings under "Literature" for descriptions of the literature courses, any of which may be taken concurrently with 203–213 or 200 (offered by Modern Languages and Linguistics.

FRLIT 210 Intermediate French Conversation
Fall or spring. 2 credits. Limited to 15 students. Prerequisite: French 203 or equivalence (Q+) on the Cornell Advanced Standing Examination (CASE).
Fall: T R 8:40–9:55, 11:40–12:55, or 2:55–4:10; spring: T R 10:10–11:25 or 1:25–2:40. A. Berger and staff.
The course is based on audiovisual materials used in class; slides, video strips, and recordings will accompany extensive discussions. A modest amount of reading each week will aim at increasing students' active vocabulary.

FRLIT 310 Advanced French Conversation
Spring. 2 credits. Limited to 15 students. Priority given to seniors. Prerequisite: French 213 or Cornell Advanced Standing Examination (CASE) placement of Q++.
T R 8:40–9:55, 11:40–12:55, 1:25–2:40 or 2:55–4:10. A. Berger and staff.
This course is based on discussion of articles published in the French press. A few audio and video recordings and films will also be used.

FRLIT 311 Advanced French I
Fall. 4 credits. Limited to 15 students. Prerequisite: French 213 or placement by the Cornell Advanced Standing Examination (CASE).
M W F 9:05, staff; T R 10:10–11:25, D. Polachek, or T R 2:55–4:10, N. Furman.
All-skills course. Detailed study of present-day syntax. Reading and discussion of texts of cultural relevance. Weekly papers.

FRLIT 312 Advanced French II
Spring. 4 credits. Limited to 15 students. Prerequisite: French 311 or placement by the Cornell Advanced Standing Examination (CASE).
M W F 10:10 or T R 11:40–12:55.
A. Berger and staff.
Continuation of work done in French 311. Less emphasis will be placed on study of grammar, more on the examination of texts, on questions of style, and on oral presentation by students. Weekly papers.

FRLIT 400 Semiotics and Language (also Comparative Literature 410 and Linguistics 400)
Spring. 4 credits. Prerequisite: some background in an area relevant to semiotics: e.g., linguistics, philosophy, literature, psychology, or anthropology or permission of the instructor.
To be announced. L. Waugh.
An introduction to the study of semiotics in general and to particular semiotic theories (for example, those of Saussure, Peirce, Barthes, Jakobson) and to language as a semiotic system. The particular topics to be discussed will depend on the interests of the students.

[FRLIT 408 Linguistic Structure of French I (also Linguistics 408)
4 credits. Not offered 1992–93.]

FRLIT 410 Structure of French II (also French 410 Modern Languages and Linguistics)
Fall. 4 credits. Prerequisite: permission of instructor.
To be announced. L. Waugh.
A synchronic study and analysis of modern French, with emphasis on semiotics, pragmatics, and discourse analysis.

[FRLIT 424 Composition and Style
4 credits. Not offered 1992–93.]

[FRLIT 604 Contemporary Theories of French Grammar
4 credits. Not offered 1992–93.]

FRLIT 700 French Linguistics (also French 700 Modern Languages and Linguistics)
Spring. 4 credits.
To be arranged. L. Waugh.

Literature

FRLIT 220 Introduction to French and Francophone Culture
Fall or spring. 3 credits. Prerequisite: CPT score of 600 or French 203. Conducted in French.
T R 10:10–11:25. S. Tarrow.
This course serves as an introduction to French Area Studies. It provides an overview of Francophone culture and society from 1945 to the present. Readings will include a selection of articles dealing with issues of current concern in France; works by French and Maghrebine or African writers; poetry or drama; two films will also be discussed.

FRLIT 221 Introduction to French Literature
Fall, spring, or summer. 3 credits. Prerequisites: a CPT score of 630 or French 200 or 203. French 221 serves as a prerequisite for all 300-level courses in French literature and is required (as well as French 222) of all French literature majors. Conducted in French.
Fall: M W F 9:05, 10:10, or T R 2:55–4:10; spring: M W F 9:05, 11:15, 12:20, or T R 10:10–11:25. J. Ngate and staff.
This course, divided into small sections, is intended as a first introduction to French literature, the Modern period. Texts have been chosen both as a function of their centrality to the traditional literary canon and with an eye to its current transformation. The course focuses on different theoretical approaches to reading literature, without neglecting to situate works in their historical, philosophical, and cultural context. The course considers literary genres (poetry, drama, and the novel) as solicitations to read texts differently, at different speeds, with diverse claims on our attention. It is designed to satisfy a general interest in modern French literature as well as to prepare students to pursue a French major in literature. Readings will include works of authors such as Baudelaire, Césaire, Sartre, Proust, Duras.

FRLIT 222 Studies in French Literature #
Fall or spring. 3 credits. Prerequisite: French 221 or a CPT achievement score of 650 or more (students who have not taken French 221 should obtain consent of instructor; those with scores in the 560–649 range should see the description of French 200 and 203). Required of all literature majors, but not limited to them. Conducted in French.
Fall: M W F 11:15 or T R 10:10–11:25, A. Berger and staff; spring: M W F 10:10 or T R 10:10–11:25. D. Polachek and staff.
Study of the classic literature of seventeenth-century France (Corneille, Racine, Molière, Madame de Lafayette) and its immediate forebears (Montaigne) and successors in the Enlightenment (Voltaire, Rousseau, Diderot, Beaumarchais). Special attention will be paid to the connections between classicism and humanistic trends.

[FRLIT 309 Mystery and the Mystery Story (also Comparative Literature 309)
4 credits. Not offered 1992–93.]

[FRLIT 320 French Civilization
4 credits. Not offered 1992–93.]

[FRLIT 325 The Modern French Novel: A Form in Search of Itself
4 credits. Not offered 1992–93.]

[FRLIT 329 Francophone Caribbean Literature @
4 credits. Not offered 1992–93.]

FRLIT 330 Francophone African Literature @
Spring. 4 credits.
M W F 1:25–2:15. J. Ngate.
Introduction to the works of representative poets, dramatists, novelists, and short story writers from sub-Saharan African and Madagascar. L. S. Senghor, C. Laye, F. Oyono, J. J. Rabéarivelo, S. Labou Tansi, and the Afro-Caribbean Aimé Césaire will be among the writers whose works will be read. The focus will be on the twentieth century and the nature of these writers' relationships both with the West and with Africa.

FRLIT 331 Masterpieces of French Drama I: The Classical Era #
Fall. 4 credits.
T R 1:25–2:40. D. Polachek.
This course aims both to introduce the student to the history of French theater from its medieval origins to the French Revolution and to discuss in detail the several major plays of the "neo-classical period." Dramatists whose works will be read will include, from the seventeenth century, Corneille, Racine, and Molière, and from the eighteenth century, Marivaux and Beaumarchais.

[FRLIT 332 Masterpieces of French Drama II: The Comic in the Modern Era
4 credits. Not offered 1992–93.]

FRLIT 333 Contemporary French Thought
Fall. 4 credits. Conducted in French.
M W F 12:20. R. Klein.
This course is intended to introduce students to the work of some of the major figures in contemporary French thought, in writings published since the events of May 1968. A broad range of topics and issues will be examined, with particular attention to those that have transformed traditional academic disciplines. Books have been selected not

only with a view to their theoretical interest, but with an eye to the quality of their French prose. Readings will include works by Levi-Strauss, Foucault, Cixous, Irigaray, Kristéva, Derrida, Barthes, Baudrillard.

FRLIT 334 The Novel as Masterwork #
Spring. 4 credits. Prerequisite: French 221 or permission of the instructor. Conducted in French.
M W F 12:20. N. Furman.
The second in a series of three courses that survey the French novel, this course traces the evolution of the genre in the nineteenth century. Major works of Stendhal, Balzac, Flaubert, and Zola will be emphasized.

[FRLIT 335 Romance to Revolution: The French Novel before 1789 #
4 credits. Not offered 1992–93.]

[FRLIT 338 French Poetry from Its Origins to the Revolution of 1789 #
4 credits. Not offered 1992–93.]

[FRLIT 354 New Prose, Old Prose
4 credits. Not offered 1992–93.]

[FRLIT 356 Lyon and Paris in the Sixteenth Century #
4 credits. Not offered 1992–93.]

[359 Georges Simenon
4 credits. Not offered 1992–93.]

[FRLIT 369 Comic Theater in the Seventeenth Century #
4 credits. Not offered 1992–93.]

[FRLIT 370 Perspectives on the Age of Enlightenment: "Enlightened" Literature #
4 credits. Not offered 1992–93.]

[FRLIT 371 Eighteenth-Century Theater #
4 credits. Not offered 1992–93.]

[FRLIT 375 Eighteenth-Century Novel #
4 credits. Not offered 1992–93.]

[FRLIT 379 Victor Hugo—Romantic Movement #
4 credits. Not offered 1992–93.]

[FRLIT 380 Introduction to French Romanticism #
4 credits. Not offered 1992–93.]

[FRLIT 385 Gustave Flaubert #
4 credits. Not offered 1992–93.]

[FRLIT 388 The French Lyric Romance from Symbolism to Surrealism
4 credits. Not offered 1992–93.]

[FRLIT 389 French Romanticism #
4 credits. Not offered 1992–93.]

[FRLIT 390 Modern French Criticism
4 credits. Not offered 1992–93.]

[FRLIT 394 Sartre and Existentialism
4 credits. Not offered 1992–93.]

[FRLIT 396 The Contemporary French Novel: 1950 to the Present
4 credits. Not offered 1992–93.]

[FRLIT 398 Six French Poets
4 credits. Not offered 1992–93.]

FRLIT 399 French Cinema: Semiotics of Realism, Surrealism, Existentialism
Fall. 4 credits. Prerequisite: French 201 or 204.
M W 2:30–4:25. D. Grossvogel.
Films will be used to study the significant experimentations of French authors representing important literary trends during the nineteenth and twentieth centuries, attempting to show the nature of those experimentations and how the different language of films modifies these ideas through the manner of their expression. Lectures in French and class discussions in any language.

[FRLIT 404 Cogito Ergo Sum: Thought and Existence from Descartes to Sartre (also Comparative Literature 404 and Romance Studies 404) #
4 credits. Not offered 1992–93.]

FRLIT 419–420 Special Topics in French Literature
419, fall; 420, spring. 2–4 credits each term. Prerequisite: permission of instructor.
Staff.
Guided independent study of special topics.

[FRLIT 422 Three Ages of Theater (also Comparative Literature 422)
4 credits. Not offered 1992–93.]

FRLIT 429–430 Honors Work in French
429, fall; 430, spring. 8 credits year-long course, R grade fall semester, letter grade spring semester, with permission of the adviser. Open to juniors and seniors. Consult the director of the honors program, R. Klein.

[FRLIT 435 Césaire et Lautréamont
4 credits. Not offered 1992–93.]

[FRLIT 436 Francophone African Fiction (also French 636) @
4 credits. Not offered 1992–93.]

[FRLIT 438 La Poésie de la Négritude (also French 638) @
4 credits. Not offered 1992–93.]

FRLIT 439 Oral and Written Traditions in Africa (also Comparative Literature 439) @
Fall. 4 credits.
T R 10:10–11:25. J. Ngate.
Organized around but not limited to two major African epics, Soundjata and Chaka, this course will enable us to investigate the nature, the validity, and the implications of many francophone African writers' claims to being modern versions of the griots of the oral tradition. (Reading knowledge of French recommended.)

[FRLIT 440 African Cityscapes: Urbanization and Its Literary Representations (also Society for the Humanities 440 and Comparative Literature 440) @
4 credits. Not offered 1992–93.]

FRLIT 447 Medieval Literature #
Fall. 4 credits. Prerequisite: French 221 or permission of instructor. First term not prerequisite to the second. Conducted in English.
M W F 9:05. A. Colby-Hall.
This course is designed to give students facility in reading Old French and an appreciation of major genres of medieval French literature: the epic and the theater.

FRLIT 448 Medieval Literature #
Spring. 4 credits. Prerequisite: French 221 or permission of instructor. Conducted in English.
M W F 9:05. A. Colby-Hall.
French 448 deals with the romance and the lyric. Facility in reading Old French and appreciation of these two major genres are the primary goals of this course.

[FRLIT 449 Love and Hate in the Late Middle Ages #
4 credits. Not offered 1992–93.]

[FRLIT 452 Theatre in Sixteenth-Century France #
4 credits. Not offered 1992–93.]

[FRLIT 453 Masterpieces of French Renaissance Prose #
4 credits. Not offered 1992–93.]

[FRLIT 454 Montaigne #
4 credits. Not offered 1992–93.]

[FRLIT 455 Rabelais #
4 credits. Not offered 1992–93.]

[FRLIT 456 Diverse Poetries in Sixteenth-Century France #
4 credits. Not offered 1992–93.]

[FRLIT 458 Baroque Poetry in France #
4 credits. Not offered 1992–93.]

[FRLIT 459 Petrarchism and the Lyric Experience in France (also French 659) #
4 credits. Not offered 1992–93.]

[FRLIT 460 The Moralist Tradition (also French 660) #
4 credits. Not offered 1992–93.]

[FRLIT 461 The Theater of Molière #
4 credits. Not offered 1992–93.]

[FRLIT 462 Racine #
4 credits. Not offered 1992–93.]

FRLIT 470 Perspectives on the Age of Enlightenment #
Fall. 4 credits. Conducted in French.
M W F 1:25. A. Berger.
We will study the discursive and epistemological changes that took place in the Enlightenment through the texts of the "philosophers" of that time (Montesquieu, Rousseau, Diderot, etc.). Particular attention is paid to the formation of modern notions of identity, alterity, and community.

FRLIT 472 Theater of Eighteenth Century #
Spring. 4 credits.
T R 2:55–4:10. A. Berger.

[FRLIT 473 Diderot and the Enlightenment #
4 credits. Not offered 1992–93.]

[FRLIT 485 Reading Workshop: The Short Story
4 credits. Not offered 1992–93.]

[FRLIT 487 Rimbaud and the Question of Reading #
4 credits. Not offered 1992–93.]

[FRLIT 488 Baudelaire #
4 credits. Not offered 1992–93.]

[FRLIT 490 The Roots of Modernism
4 credits. Not offered 1992–93.]

FRLIT 493 French Feminisms (also Women's Studies 493)
Fall. 4 credits.
T R 11:40–12:55. N. Furman.
This course will examine the political, theoretical, and literary concerns of contemporary French writers who have addressed *"la question de la femme/la question du féminin."* Readings will include representative texts by Simone de Beauvoir, Monique Wittig, Julia Kristeva, Jacques Lacan, Luce Irigaray, Jacques Derrida, and Hélène Cixous. Taught in English.

[FRLIT 494 Surrealism
4 credits. Not offered 1992–93.]

[FRLIT 496 The Early Twentieth-Century French Novel (also Comparative Literature 496)
4 credits. Not offered 1992–93.]

[FRLIT 497 Poetry since Baudelaire
4 credits. Not offered 1992–93.]

[FRLIT 498 Dostoevsky, Mann, and Gide (also Comparative Literature 498)
4 credits. Not offered 1992–93.]

[FRLIT 499 Fiction and Film in France (also Comparative Literature 499)
4 credits. Not offered 1992–93.]

[FRLIT 596 Colette: Can She Be a Subject of Masculine Discussion in the '80s?
4 credits. Not offered 1992–93.]

[FRLIT 607 Proseminar: The Interpretation of Texts
4 credits. Not offered 1992–93.]

[FRLIT 608 Proseminar
4 credits. Not offered 1992–93.]

[FRLIT 616 The Concept of Dramatic Tragedy in the Seventeenth and Eighteenth Centuries
4 credits. Not offered 1992–93.]

[FRLIT 628 "Un coup de dés": Mallarmé and His Critics
4 credits. Not offered 1992–93.]

[FRLIT 629 History of the French Language (also French 401 Modern Languages)
4 credits. Not offered 1992–93.]

[FRLIT 636 Francophone African Fiction (also French 436)
4 credits. Not offered 1992–93.]

[FRLIT 638 La Poésie de la Négritude (also French 438)
4 credits. Not offered 1992–93.]

FRLIT 639–640 Special Topics in French Literature
639, fall; 640, spring. 4 credits each term.
Staff.
Guided independent study for graduate students.

[FRLIT 644 Medieval Seminar: The Old French Epic
4 credits. Not offered 1992–93.]

[FRLIT 646 Medieval Seminar: Villon
4 credits. Not offered 1992–93.]

[FRLIT 648 Medieval Seminar: Le Roman de la Rose
4 credits. Not offered 1992–93.]

[FRLIT 656 The Subliterary and the Nonliterary in Early Modern France
4 credits. Not offered 1992–93.]

[FRLIT 659 Petrarchism and the Lyric Experience in France (also French 459)
4 credits. Not offered 1992–93.]

[FRLIT 660 The Moralist Tradition (also French 460)
4 credits. Not offered 1992–93.]

[FRLIT 661 Racine and His Critics
4 credits. Not offered 1992–93.]

[FRLIT 662 Racine
4 credits. Not offered 1992–93.]

[FRLIT 663 La Fontaine and Perrault: Fables, Tales, and Narrative Traps
4 credits. Not offered 1992–93.]

FRLIT 664 Seminar in Late Seventeenth-Century Literature
Fall. 4 credits. Conducted in French.
R 2:30–4:25. P. Lewis.
The last thirty years of Louis XIV's reign are often characterized by historians of culture as a period of drift, indecision, and crisis, marked by the quarrel of the Ancients and Moderns and by works that anticipate the thought of the enlightenment. Yet the late eighties and early nineties yielded a remarkable output of important, now canonical works by Boileau, Fénelon, Fontenelle, La Bruyère, La Fontaine, Perrault, and Racine. This seminar will explore, with respect to the work of these writers and of institutions such as the academies, the inaugural vision of "le grand siècle," its literature and culture that was being consolidated as the century approached its chronological end.

[FRLIT 665 The Emergence of Aesthetics
4 credits. Not offered 1992–93.]

[FRLIT 666 Seventeenth-Century Seminar: Moralities in Fiction: The Classical Moment (also Comparative Literature 666)
4 credits. Not offered 1992–93.]

[FRLIT 669 Seventeenth-Century Seminar: Illusion and Representation
4 credits. Not offered 1992–93.]

[FRLIT 676 The Libertine Novel
4 credits. Not offered 1992–93.]

[FRLIT 679 Comedy and Philosophy in the French Enlightenment
4 credits. Not offered 1992–93.]

[FRLIT 680 Amours romantiques
4 credits. Not offered 1992–93.]

FRLIT 683 The Appeal of the Exotic
Spring. 4 credits. Conducted in French.
W 2:30–4:25. N. Furman.
From Montesquieu to Marguerite Duras, the attraction of the foreign, the charm of the unfamiliar, the invention of the other have been obsessive literary themes. But the "exotic" bespeaks its authors as it reveals the social and cultural constructs of gender, sexuality, racial and ethnic identity. Representative texts from Chateaubriand, Staël, Mérimée, Gobineau, Flaubert, Loti, and others will be surveyed.

[FRLIT 685 Stendhal, Balzac, Flaubert (also Comparative Literature 610)
4 credits. Not offered 1992–93.]

[FRLIT 687 Poetry and the Threat of Modernity: The Case of Rimbaud
4 credits. Not offered 1992–93.]

[FRLIT 688 Gerard de Nerval
4 credits. Not offered 1992–93.]

[FRLIT 689 Bohemians and Dandies
4 credits. Not offered 1992–93.]

[FRLIT 690 Andre Gide (also Comparative Literature 695)
4 credits. Not offered 1992–93.]

[FRLIT 691 Laughter
4 credits. Not offered 1992–93.]

[FRLIT 692 Sartre and Genet
4 credits. Not offered 1992–93.]

[FRLIT 693 Nineteenth-Century Seminar
4 credits. Not offered 1992–93.]

[FRLIT 694 Surrealism
4 credits. Not offered 1992–93.]

FRLIT 695 Le Nouveau Roman
Fall. 4 credits.
T 2:30–4:25. D. Grossvogel.
In Robbe-Grillet's expression, the "Nouveau Roman" is less a theory than a process of research. Its precursors are writers such as Kafka, Joyce, and Beckett, and vectors that effected it were motion pictures and the valorizing of a phenomenological text over its imitative function. Other than Alain Robbe-Grillet, this historical moment was made famous by authors otherwise as diverse as Claude Simon, Nathalie Sarraute, Marguerite Duras, Michel Butor, Robert Pinget, and Jean Ricardou. The course readings and discussions will draw on these authors as theorists and novelists.

[FRLIT 696 Proust and Mystery
4 credits. Not offered 1992–93.]

FRLIT 697 Philosophy of Money (also Anthropology 625)
Spring. 4 credits.
M 2:30–4:25. R. Klein and J. Siegel.
This course will examine varieties of exchange that takes place in the form of money. It will focus on the following topics: Myths surrounding money and theories of its origin. The conditions of its circulation: money economies versus those based on gift-giving, gambling, and prostitution. The treatment of money in psychoanalysis, its psychic and literary thematization, particularly in relation to gender, race, and anti-semitism. Anthropological material from non-Western cultures will also be introduced. Readings will include the work of Simmel, Marx, Mauss, Freud, Bataille, and Derrida.

Italian

A. Grossvogel, M. Migiel (directors of undergraduate studies; fall: A. Grossvogel; spring: A. Colby-Hall.)

The Major

Students who wish to major in Italian should choose a faculty member to serve as a major adviser; the general plan and the details of the student's course of study will be worked out in consultation with the adviser. Italian majors are encouraged to take courses in related subjects such as history, art history, music, philosophy, anthropology, classics, linguistics, and other modern languages and literatures. While a major often occupies only the junior and senior years, it is wise for students to seek faculty advice about the major as early as possible.

Students who elect to major in Italian ordinarily should have completed Italian 201 by the end of their sophomore year. Exemptions can be made on the basis of an examination. Students majoring in Italian are expected to become conversant with a fair portion of the masterworks of Italian literature, to acquaint themselves with the outlines of Italian literary history, and to develop some skill in literary analysis. To this end, students will be expected to complete successfully 32 credits of Italian literature courses at the 300 level or higher, with papers to be written in Italian or English. Required courses for the major are Italian 303, 304, and 427. Italian

402, History of the Italian Language, and 403, Linguistic Structure of Italian, may be counted toward the 32 credits required for the major (an introductory linguistics course is a prerequisite of Italian 402 and 403).

Students majoring in Italian will also be expected to acquire competence in the handling of the language. That competence may be demonstrated by passing an oral and written examination to be arranged with the adviser.

Italian majors will also be required to complete successfully two courses in related fields (for example, Italian history, Italian art history, literary theory).

Italian majors may study in Italy, generally during their junior year, under any of those study-abroad plans organized by American universities that allow the transfer of grades and credit, such as the Cornell program in Rome.

The College of Architecture, Art, and Planning maintains a program open to all qualified students attending Cornell. The program is housed in the sixteenth-century Palazzo Massimo, designed by the architect Baldassare Peruzzi, on the Corso Vittorio Emanuele, in the heart of Rome. Students may enroll for a semester in the fall or spring. Courses regularly taught at the Palazzo Massimo include Italian language (beginning and intermediate); Architecture 300, 401, 402, 500, 502, Design Studio; Architecture 338 and 399, Special Topics in Architectural History; Architecture 458, Special Projects in Design Communications; Architecture 367, Contemporary Italian Culture; Architecture 510, Thesis Introduction; Art 251, 311, 322, and 371; and History of Art 371, Renaissance and Baroque Art in Rome.

To be eligible, students must have completed the first two years of their curriculum requirements and be in good academic standing.

Fees. Depending on the course, a small fee may be charged for copies of texts for course work.

Literature

Most language courses and Italian linguistics courses are offered by Modern Languages and Linguistics. Advanced language courses and all literature courses are listed below.

ITALL 201 Introduction to Italian Literature
Fall or spring. 3 credits. Prerequisite: permission of instructor. Conducted in Italian.
M W F 1:25. M. Migiel and staff.
Exploration of the cultural, sociological, and aesthetic implications of Italian literary texts. Emphasis on the development of students' oral, written, and reading skills. Readings will include prose, poetry, and drama written by major Italian authors.

ITALL 303 Introduction to Medieval and Renaissance Literature #
Fall. 4 credits.
T R 10:10–11:25. B. Ballaro.
The course will focus on the major figures and texts of medieval and Renaissance literature with an eye on the wider cultural context of Italy. We will begin with readings and discussions of the poets of the Sweet New Style (Guinizzelli, Calvalcanti, and Dante) and selections from Petrarch's *Canzoniere* and Boccaccio's *Decameron*. Finally, we shall look at some poems of Michelangelo, one canto from Ariosto's *Orlando Furioso*, and Machiavelli's *The Prince*.

[ITALL 304 Introduction to Modern Italian Literature
4 credits. Not offered 1992–93.]

[ITALL 322 Italian Civilization: Literature and Regionalism
4 credits. Not offered 1992–93.]

[ITALL 340 Literature and Society in the Italian Renaissance #
4 credits. Not offered 1992–93.]

[ITALL 354 Italian Humanism (also Italian 654) #
4 credits. Not offered 1992–93.]

[ITALL 357 The Italian Renaissance Epic #
4 credits. Not offered 1992–93.]

[ITALL 370 Eighteenth-Century Thought #
4 credits. Not offered 1992–93.]

[ITALL 381 Narrative of Verga, D'Annunzio, Svevo, and Pirandello (also Italian 681)
4 credits. Not offered 1992–93.]

[ITALL 384 Early Modern Italian Autobiography (also Italian 684) #
4 credits. Not offered 1992–93.]

ITALL 390 Literature to Cinema
Fall. 4 credits. Conducted in English.
T R 2:30–4:25. A. Grossvogel.
A study of the ways literary language has influenced Italian cinema. The films to be screened will be by Antonioni, Bertolucci, Bolognini, De Sica, Pasolini, Rossellini, Taviani, Visconti, and Zurlini. The works of literature to be read in conjunction with these films will include selections from Boccaccio's *Decameron* and from the narrative works of Bassani, Borges, Buzzati, Cortázar, Mann, Moravia, Tomasi di Lampedusa, and Verga.

[ITALL 391 The Theater of Verga, D'Annunzio, Svevo, and Pirandello (also Italian 691)
4 credits. Not offered 1992–93.]

[ITALL 393 Narrative and Ideology in Contemporary Italian Literature (also Italian 693 and Comparative Literature 393)
4 credits. Not offered 1992–93.]

[ITALL 395 Readings in Contemporary Italian Fiction
4 credits. Not offered 1992–93.]

[ITALL 399 Cinema to Literature
4 credits. Not offered 1992–93.]

ITALL 419–420 Special Topics in Italian Literature
419, fall; 420, spring. 2–4 credits each term. Prerequisite: permission of instructor.
Staff.
Guided independent study of specific topics.

ITALL 427 Dante: *La Divina Commedia* #
Fall. 4 credits.
M 2:30–4:25. Staff.
Intensive study of Dante's *Divina Commedia*, with an introduction to relevant critical and methodological issues.

ITALL 429–430 Honors in Italian Literature
429 fall; 430, spring. 8 credits. Year-long course, R for fall semester; letter grade for spring semester. Limited to seniors. Prerequisite: permission of instructor.
Staff.

[ITALL 437 Petrarch: *Canzoniere* #
4 credits. Not offered 1992–93.]

[ITALL 445 Boccaccio (also Italian 645) #
4 credits. Not offered 1992–93.]

[ITALL 448 Italian Lyric Poetry, 1255–1600: The Formation of the Canon #
4 credits. Not offered 1992–93.]

ITALL 458 Tasso (also Italian 658) #
4 credits. Not offered 1992–93.]

[ITALL 472 Eighteenth-Century Italian Theater: From Melodrama to Tragedy #
4 credits. Not offered 1992–93.]

[ITALL 474 Opera (also German 374/674 and Music 374/674) #
4 credits. Not offered 1992–93.]

ITALL 485 The Nineteenth Century: Foscolo, Manzoni, Leopardi #
Fall. 4 credits. Conducted in Italian.
W 2:30–4:25. A. Grossvogel.
Manzoni's novel together with Foscolo's *Ultime lettere di Jacapo Ortis* and Leopardi's *Operette morali* constitute the now acknowledged major contribution to the renewal of literary prose in the nineteenth century in Italy. A close reading of the texts, of their poetics, and their proximity will bring out intentions, achievements, and the unwilling reciprocity of the three major Italian writers of the century as they set out, in the brief span of a quarter of a century, to constitute modern prose.

[ITALL 488 Giacomo Leopardi and Nineteenth-Century Poetry #
4 credits. Not offered 1992–93.]

ITALL 490 Modern Italian Women Writers (also Italian 690)
Spring. 4 credits. Conducted in English.
T R 2:55–4:10. B. Ballaro.
In this course, we will examine selected novels of twentieth-century Italian woman writers. the course will focus on the following questions: what are the possibilities and problems that arise from the attempt to construct a "women's canon" of modern Italian literature? What, if anything, constitutes "scrittura femminile"? How may we compare Italian women's writings to their Anglo-American and French counterparts? In what ways do the texts in question display (or not display) connections with feminist discourses? What is the relation between the personal and the political, between history and (auto)biography in these texts? How do they represent problems of difference in terms of gender, race/religion (*Lessico famigliare, La storia*), and sexuality (*Lettere a Marina*), maternity, family ties? What are the differences between élite, "highbrow" texts like Banti's and Manzini's and "popular" novels like those of de Céspedes and Cialente? How do these texts evolve over time (stylistically, thematically, linguistically, politically)?

[ITALL 495 Readings in Contemporary Italian Fiction
4 credits. Not offered 1992–93.]

[ITALL 496 Futurism in Italy and Europe
4 credits. Not offered 1992–93.]

[ITALL 497 Modern Italian Poetry: D'Annunzio to Montale
4 credits. Not offered 1992–93.]

[ITALL 498 Eugenio Montale and Contemporary Italian Poetry
4 credits. Not offered 1992–93.]

[ITALL 557 The Italian Renaissance Epic
4 credits. Not offered 1992–93.]

ITALL 627 Dante: *La Divina Commedia* (also Italian 427)
Fall. 4 credits.
M 2:30–4:25. Staff.
See Italian 427 for description.

ITALL 639–640 Special Topics in Italian Literature
639, fall; 640, spring. 4 credits each term.
Staff.

[ITALL 645 Boccaccio (also Italian 445)
4 credits. Not offered 1992–93.]

[ITALL 654 Italian Humanism (also Italian 354)
4 credits. Not offered 1992–93.]

ITALL 658 Tasso (also Italian 458)
4 credits. Not offered 1992–93.]

[ITALL 681 Narrative of Verga, D'Annunzio, Svevo, and Pirandello (also Italian 381)
4 credits. Not offered 192–93.]

[ITALL 684 Early Modern Italian Autobiography (also Italian 384)
4 credits. Not offered 1992–93.]

ITALL 690 Modern Italian Women Writers (also Italian 490)
Spring. 4 credits.
T R 2:55–4:10. B. Ballaro.
See Italian 490 for description.

[ITALL 691 Theater of Verga, D'Annunzio, Svevo, and Pirandello
4 credits. Not offered 1992–93.]

[ITALL 693 Narrative and Ideology (also Italian 393 and Comparative Literature 393)
4 credits. Not offered 1992–93.]

Romance Studies

Literature

[ROMS 361 The Culture of Early Renaissance (also Comparative Literature 361 and History of Art 350) #
4 credits. Not offered 1992–93.]

[ROMS 404 Cogito Ergo Sum: Thought and Existence from Descartes to Sartre (also French 404 and Comparative Literature 404) #
4 credits. Not offered 1992–93.]

[ROMS 431 Isms: General Concepts in Modern Cultural History (also Comparative Literature 431)
4 credits. Not offered 1992–93.]

[ROMS 459 Being, God, Mind: Key Terms of Western Thought from Plato to Vico (also Comparative Literature 369) #
4 credits. Not offered 1992–93.]

[ROMS 460 Biology and Theology: Approaches to the Origin of Life, Evolution, Heritage and Freedom, Sexuality and Death (also Comparative Literature 460)
4 credits. Not offered 1992–93.]

[ITALL 497 Heidegger on Language, Art, and Literature (also Comparative Literature 497)
4 credits. Not offered 1992–93.]

Spanish

D. Castillo (director of undergraduate studies, spring 1993), U. J. DeWinter, J. W. Kronik, A. Monegal (director of undergraduate studies, fall 1992), C. Moron-Arroyo, J. Piedra, M. Stycos, J. Tittler

The Major

The major is designed to give students proficiency in the oral and written language, to acquaint them with Hispanic culture, and to develop their skill in literary and linguistic analysis. Satisfactory completion of the major should enable students to meet language and literature requirements for teaching, to continue with graduate work in Spanish or other appropriate disciplines, or to satisfy standards for acceptance into the training programs of the government, social agencies, and business concerns. A Spanish major combined with another discipline may also allow a student to undertake preprofessional training for graduate study in law or medicine. Students interested in a Spanish major are encouraged to seek faculty advice as early as possible. For acceptance into the major, students should consult the director of undergraduate studies in Spanish—Professor Monegal (fall 1992) or Professor Castillo (spring 1993)—who will admit them to the major and choose an adviser from the Spanish faculty. Spanish majors will then work out a plan of study in consultation with their advisers. Previous training and interests as well as vocational goals will be taken into account when the student's program of courses is determined.

Spanish 201 and 204 or 212 (or equivalent) are prerequisite to entering the major in Spanish. All majors will normally include the following core courses in their programs:

1) Spanish 315–316–318
2) Spanish 311 and 312 (or equivalent)

Spanish majors have great flexibility in devising their programs of study and areas of concentration. Some typical options of the major are:

1) Spanish literature, for which the program of study normally includes at least 20 credits of Spanish literature beyond the core courses. Literature majors are strongly urged to include in their programs courses in all the major periods of Hispanic literature.
2) A combination of literature and linguistics.
3) Either of the above options with certain courses in other disciplines counted toward the major. Whichever option a student chooses, he or she is encouraged to enrich the major program by including a variety of courses from related fields or by combining Spanish with related fields such as history, philosophy, sociology, anthropology, art, music, Classics, English, comparative literature, and other foreign languages and literatures. The interdepartmental programs in Latin American Studies and Hispanic American Studies sponsor relevant courses in a variety of areas.

The J. G. White Prize and Scholarships are available annually to students who achieve excellence in Spanish.

For the major in Spanish linguistics, see Modern Languages and Linguistics—Spanish.

Study abroad in Spain. Cornell and the University of Michigan cosponsor an academic year in Spain program. Students enrolled in this program spend the first four weeks before the fall semester begins in a residential college located on the campus of the University of Madrid, where they take a course in Spanish language and contemporary society and take advantage of special lectures and field trips in Madrid and Castile. This course carries three credits. In early October the program moves to Seville, where students enroll in as many regular classes at the University of Seville as their language competency and general education permit. Their academic work is supplemented by courses designed explicitly for the program by Seville faculty, as well as a seminar regularly offered by the resident director, who is chosen from the faculty of either Cornell or Michigan. The special courses normally include history of art and architecture, Spanish composition and syntax, and modern Spanish history. In Seville students live with selected families or in a few cases in "colegios mayores." Cornell-Michigan also maintains a center in Seville, which is used by students for special seminars, tutorials, lectures, and informal gatherings.

Applicants are expected to have attained at least proficiency in Spanish prior to departure. Students are strongly encouraged to study abroad for the entire year rather than for one semester. Students interested in the study abroad program should consult with the Cornell Abroad office for further information.

Honors. Honors in Spanish may be achieved by superior students who want to undertake guided independent reading and research in an area of their choice. Students in the senior year select a member of the Spanish faculty to supervise their work and direct the writing of their honors essays (see Spanish 429–430).

Fees. Depending on the course, a small fee may be charged for film use or for copies of texts for course work.

Language

Most language courses and Spanish linguistic courses are offered by Modern Languages and Linguistics. Advanced language courses and all literature courses are listed below.

Note: Students placed in the 200-level courses have the option of taking language and/or literature courses; see listing under Spanish 201 for description of the literature course that may be taken concurrently with the 203–204 (offered by Modern Languages and Linguistics) or 211–212 language courses described below.

[SPANR 211 Intermediate Spanish
3 credits. Not offered 1992–93.]

[SPANR 212 Intermediate Spanish
3 credits. Not offered 1992–93.]

SPANR 311 Advanced Composition and Conversation
Fall. 4 credits. Prerequisite: Spanish 204 or 212 or equivalent.
M W F 10:10, 12:20 or T R 10:10–11:25. M. Stycos and staff.
Advanced language skills, developed through reading, grammar review, and intensive practice in speaking, writing, and translation. Analysis of present-day Spanish usage in a wide variety of oral and written texts.

SPANR 312 Advanced Composition and Conversation
Spring. 4 credits.
M W F 10:10, 11:15 or 12:20. M. Stycos and staff.
Readings and class discussion will focus on the stylistic analysis of modern texts. Increased emphasis, through weekly essays, on students' development of an effective Spanish prose style.

Literature

SPANL 201 Introduction to Hispanic Literature @
Fall or spring. 3 credits. Prerequisite: qualification in Spanish or permission of instructor. The course is divided into small sections and is conducted mainly in Spanish. (Fulfills both the language proficiency requirement and, followed by a 300-level Spanish literature course, the humanities distribution requirement. The literature course that normally follows Spanish 201 is either 315, 316, or 318.)
Fall: M W F 9:05, 11:15, 12:20 or T R 1:25–2:40; spring: M W F 9:05, 10:10, T R 10:10–11:25, 11:40–12:55. M. Stycos and staff.
An intermediate reading course designed to improve reading, writing, speaking, and comprehension skills in Spanish through the reading and discussion of contemporary literary works of various genres (narrative prose, drama, poetry) from Spain and Spanish America. Emphasis is placed on the development of fluency in reading and of critical and analytical abilities. The cultural, sociological, and aesthetic implications of texts by authors such as Borges, Cortázar, Fuentes, García Márquez, García Lorca, and Cela are considered.

SPANL 210 Introduction to Hispanic American Studies (also HASP 210)
Fall. 3 credits.
M W F 2:30–3:20. L. Carrillo.
This course offers a survey of topics and issues relevant to the historical, social, cultural and educational development of Hispanic groups in the United States. Topics to be examined may include: Latinos and the environment; culture, language and multiculturalism; gender and society. Readings may include selections from historical travel journals, contemporary literature and relevant social science documents. Guest speakers from Cornell's staff as well as visiting writers and lecturers will broaden the scope of the course.

SPANL 240 Muslims, Christians, and Jews in Islamic Spain: Literature and Society (also Comparative Literature 234, Religious Studies 234 and Near Eastern Studies 234) @ #
Spring. 3 credits.
T R 1:25–2:40. R. Brann.
Islamic Spain was a frontier society comprising six distinct ethnic-religious communities: Arabs, *muwalladun* (native Iberian converts to Islam), Berbers, *musta'ribun* (Arabicized Christians), Jews, and "Slaves" (European slave soldiers). This course will introduce students to the literature, culture, and society of al-Andalus (Islamic Spain) from the Unmayad emirate until the close of the Reconquista (711-1248). The development of Arabic and Hebrew poetry will be surveyed with focus on style, genres, and motifs. Conflicting theories of the origin and identity of Hispano-Arabic poetry and culture will also be considered.

[SPANL 300 Gender and Sexuality in Latin America (also Spanish Literature 400) @
4 credits. Not offered 1992–93.]

SPANL 313 Approaches to Spanish Culture
Fall. 4 credits.
T R 10:10–11:25. U. DeWinter.
An examination of various aspects of the history and culture of Spain. Topics include: native and foreign interpretations of Spain; the origins of ethnic and linguistic differences; post-Civil War politics; nationalism and regionalism; contemporary Spanish society; the role of women; education; religion; literature, art, and leisure activities. The course will be conducted in Spanish.

SPANL 315 Readings in Sixteenth- and Seventeenth-Century Hispanic Literature #
Spring. 4 credits. Prerequisite: Spanish 201, four years of high school Spanish, or permission of instructor. This course is not a prerequisite for Spanish 316 or 318.
M W F 11:15. C. Arroyo.
Readings and discussion of representative texts of the period from both Spain and her colonies in the New World: Garcilaso de la Vega, Lazarillo de Tormes, San Juan de la Cruz, Cervantes, Lope de Vega, Calderón, and others.

SPANL 316 Readings in Modern Spanish Literature
Fall or spring. 4 credits. Prerequisite: Spanish 201 or 4 years of high school Spanish or permission of instructor. Taught in Spanish.
Fall: T R 2:55–4:10, A. Monegal; spring: M W F 1:25, M. Stycos or T R 1:25–2:40, staff.
Readings and discussion of representative texts from Spain from the romantic period to the present. Bécquer, Galdós, Unamuno, García Lorca, Cela, and others.

[SPANL 317 Readings in Colonial Spanish-American Literature @ #
4 credits. Not offered 1992–93.]

SPANL 318 Readings in Spanish-American Literature @
Fall or spring. 4 credits.
Fall: M W F 9:05, J. Tittler; T R 1:25–2:40, staff; spring: T R 11:40–12:55, D. Castillo or T R 2:55–4:10, staff.
Readings and discussion of representative texts of the nineteenth and twentieth centuries from Spanish America: Darío, Borges, Neruda, Paz, Cortázar, García Márquez, and others.

[SPANL 323 Readings in Latin American Civilization @
4 credits. Not offered 1992–93.]
Note: The prerequisite for the following courses, unless otherwise indicated, is Spanish 315, 316, or 318, or permission of instructor.

[SPANL 332 The Modern Drama in Spanish America @
4 credits. Not offered 1992–93.]

[SPANL 333 The Spanish-American Short Story
4 credits. Not offered 1992–93.]

SPANL 345 Contemporary Spanish-American Novel @
Fall. 4 credits. Prerequisite: Spanish 317 or equivalent.
M W F 11:15. J. Tittler.
Reading and discussion of selected works of narrative fiction by today's leading authors: Cabrera Infante, Cortázar, Donoso, Fuentes, García Márquez, Puig, Vargas Llosa, and others. Two abiding concerns will be the way in which history interacts with aesthetic form and the role of the bicultural reader in actualizing the text's potential.

[SPANL 346 Hispanic Caribbean Culture and Literature @
4 credits. Not offered 1992–93.]

[SPANL 347 Spanish America in Black and White @
4 credits. Not offered 1992–93.]

[SPANL 351 Spanish Drama of the Golden Age #
4 credits. Not offered 1992–93.]

SPANL 355 Cervantes: Don Quijote #
Fall. 4 credits. Conducted in Spanish.
T R 1:25–2:40. C. Arroyo.
Close reading of Cervantes' masterpiece. Discussions will consider the text as a mirror of its historical moment, of its self-conscious author, and of its readers' search for meaning.

[SPANL 356 Spanish Lyric Poetry of the Golden Age #
4 credits. Not offered 1992–93.]

[SPANL 368 The Birth of the Novel in Spain #
4 credits. Not offered 1992–93.]

[SPANL 375 The Picaresque Novel in European Perspective #
4 credits. Not offered 1992–93.]

[SPANL 376 The Contemporary Spanish Novel
4 credits. Not offered 1992–93.]

[SPANL 379 Luis Buñuel and the Cinema of Poetry (also Theatre Arts 389)
4 credits. Not offered 1992–93.]

SPANL 380 Spain during the Franco Regime
Spring. 4 credits.
M W F 1:25. C. Arroyo.
A historical summary of the Franco period: political system, domestic and international politics, different periods of the regime. A historical summary of the intellectual trends: existentialism, neo-Marxism, neo-positivism, transition and post-modernism. Basic literary works will be read as they reflect both the political and cultural milieu and as they dialectically contribute to the historical change that brought about the peaceful transition from dictatorship to democracy.

[SPANL 385 The Nineteenth-Century Spanish Novel (also Spanish Literature 485) #
4 credits. Not offered 1992–93.]

[SPANL 386 Studies in Spanish Realism and Naturalism
4 credits. Not offered 1992–93.]

[SPANL 389 The Generation of 1898 #
4 credits. Not offered 1992–93.]

SPANL 390 Fiction of Manuel Puig @
Spring. 4 credits. Prerequisite: Spanish 317.
T R 1:25–2:40. J. Tittler.
Often dismissed as "kitsch," "camp," or "pop" in its literary register, when not hailed as revolutionary in its use of montage and other defamiliarizing narrative devices, the fiction of Manuel Puig has attracted considerable attention among critics and general readers alike. In reading and discussing such works as *La traición de Rita Hayworth, El beso de la mujer araña,* and *Maldición eterna a quien lea estas páginas,* among others, we shall explore the delightfully insidious role the culture industry plays in contemporary life. Puig's seductively mass-mediated novels will be shown to float on a turbulent thematic sea of uncertain personal identity, political commitment, and collective myths.

[SPANL 391 The Post–Civil War Drama in Spain
4 credits. Not offered 1992–93.]

[SPANL 392 The Spanish Vanguard Theater: Lorca and Valle-Inclán
4 credits. Not offered 1992–93.]

SPANL 393 Modern Spanish Short Fiction
Fall. 4 credits. Conducted in Spanish.
T R 11:40–12:55. A. Monegal.
This course will study the evolution of the short story in Spain, from the nineteenth century to the present, both as an autonomous, though marginal, tradition and in relation to other forms of prose writing that determine its definition as a genre, in particular poetic prose and the short novel. Readings include works by Bécquer, Clarín, Pardo Bazán, Valle-Inclán, Unamuno, Gómez de la Serna, Larrea, Cernuda, Aub, Ayala, Delibes, Aldecoa, Matute, Martín Gaite, Goytisolo, Puértolas, and Fernández Cubas.

[SPANL 394 Trans-Atlantic Renaissance (also Comparative Literature 394) #
4 credits. Not offered 1992–93.]

[SPANL 395 The Novel in Spain after the Civil War
4 credits. Not offered 1992–93.]

[SPANL 396 Modern U.S.-Hispanic Prose Fiction
4 credits. Not offered 1992–93.]

[SPANL 397 Colombian Literature @
4 credits. Not offered 1992–93.]

[SPANL 398 Post-Revolutionary Mexican Novel @
4 credits. Not offered 1992–93.]

[SPANL 399 Spanish Film
4 credits. Not offered 1992–93.]

[SPANL 400 Gender and Sexuality in Latin America (also Spanish Literature 300) @
4 credits. Not offered 1992–93.]

[SPANL 415 The Black Within: Hispanic Race and Literature @
3 credits. Not offered 1992–93.]

SPANL 419–420 Special Topics in Hispanic Literature
419, fall; 420, spring. 2–4 credits each term. Prerequisite: permission of instructor.
Staff.
Guided independent study of specific topics. For undergraduates interested in special problems not covered in courses.

SPANL 429–430 Honors Work in Hispanic Literature
429, fall; 430, spring. 8 credits. Year-long course, R grade fall semester, letter grade spring semester. Limited to seniors. Prerequisite: permission of instructor.
C. Arroyo.

[SPANL 440 Medieval Spanish Literature #
4 credits. Not offered 1992–93.]

[SPANL 450 Literature of Conquest #
4 credits. Not offered 1992–93.]

[SPANL 451 Spanish Theater of the Golden Age #
4 credits. Not offered 1992–93.]

[SPANL 455 Cervantes: *Don Quijote* #
4 credits. Not offered 1992–93.]

[SPANL 466 Golden-Age Spanish Short Fiction #
4 credits. Not offered 1992–93.]

SPANL 468 Spanish Poetry of Golden Age #
Fall. 4 credits.
W 2:30–4:25. C. Arroyo.
Reading of the canonical poets of the sixteenth and seventeenth centuries from Garcilaso to Quevedo. Ideas of Petrarchism, courtly and Platonic love. Topical vs. personal expression. Humanistic and mystical poetry. Semiotics of the mystical text. The so-called schools of Salamanca and Seville. The idea of school, idiolect, and cultural period as categories for a possible history of literature.

[SPANL 469 Mystics and Moralists #
4 credits. Not offered 1992–93.]

[SPANL 475 The Picaresque Novel in a European Perspective (also Comparative Literature 475) #
4 credits. Not offered 1992–93.]

[SPANL 479 Colonial Spanish-American Literature: Voices of the Colonized # @
4 credits. Not offered 1992–93.]

[SPANL 481 Eighteenth- and Nineteenth-Century Spanish Drama #
4 credits. Not offered 1992–93.]

[SPANL 485 The Nineteenth-Century Spanish Novel (also Spanish Literature 385) #
4 credits. Not offered 1992–93.]

[SPANL 488 The Novel in Early Twentieth-Century Spain
4 credits. Not offered 1992–93.]

[SPANL 489 Hispanic Romanticism #
4 credits. Not offered 1992–93.]

[SPANL 490 Surrealism in Spain
4 credits. Not offered 1992–93.]

[SPANL 491 The Poetics of Tragedy in Contemporary Spanish Drama
4 credits. Not offered 1992–93.]

[SPANL 492 Latin-American Women Writers (also Women's Studies 481 and Comparative Literature 482) @
4 credits. Not offered 1992–93.]

[SPANL 495 Gabriel García Márquez @
4 credits. Not offered 1992–93.]

[SPANL 496 The Fiction of Manuel Puig @
4 credits. Not offered 1992–93.]

[SPANL 497 Spanish Poetry and Poetics
4 credits. Not offered 1992–93.]

[SPANL 498 Mallarmé in Latin America @
4 credits. Not offered 1992–93.]

[SPANL 499 Borges (also Comparative Literature 499) @
4 credits. Not offered 1992–93.]

SPANL 639–640 Special Topics in Hispanic Literature
639, fall; 640, spring. 4 credits each term.
Staff.

[SPANL 667 Seminar in Golden Age Literature: Golden Age Poetry and Poetics #
4 credits. Not offered 1992–93.]

[SPANL 669 Mystics and Moralists
4 credits. Not offered 1992–93.]

[SPANL 686 Seminar in Nineteenth-Century Spanish Literature #
4 credits. Not offered 1992–93.]

SPANL 690 Hispanic Feminisms (also Women's Studies 692)
Spring. 4 credits. Conducted in Spanish.
R 2:30–4:25. D. Castillo.
This seminar is designed to explore the interrelationship of feminist literary theory and the narrative production of the Hispanic world. In this inquiry, we will be developing feminist critical methodologies (based on readings of essays by thinkers such as Barthes, Castellanos, Derrida, Freud, and Glantz) and defining strategies or possibilities for feminist criticism(s). Finally, we will study the ways in which feminist analyses of literature alter our readings of texts by men (Isaacs, Cortázar, Onetti, García Lorca) as well as by women (Pardo Bazán, Tusquets, Valenzuela, Garro), and how they change our conceptions of criticism and the task of the critic.

SPANL 693 Freud in Latin America (also Comparative Literature 697) @
Fall. 4 credits.
T 2:30–4:25. J. Piedra.
A selection of basic and less basic Freud for readers applied to Spanish-American prose. The main theme will be the implications of the Oedipal complex in the nation-formation mechanism, as exemplified by Spanish Americans' problematic relationship to Spanish as a Step-Mother Tongue, as well as to European intellectual paternalism and Uncle Sam's critical nepotism as theoretical Big Brothers. Besides the selective readings from Freud's opus and Freudian-trained Latin American theorists, we will study Spanish-American fiction with an Oedipal theme.

[SPANL 694 Seminar in Modern Spanish Literature: Hispanic Metafiction
4 credit hours. Not offered 1992–93.]

[SPANL 695 Postmodern Spanish American Fiction
4 credit hours. Not offered 1992–93.]

[SPANL 697 Hispanic Poetry and The Visual Arts
4 credits. Not offered 1992–93.]

RUMANIAN

See Department of Modern Languages and Linguistics—Romanian.

RUSSIAN

E. W. Browne, P. Carden (director of undergraduate studies [literature], 235 Goldwin Smith Hall, 255-8350), G. Gibian, R. L. Leed (director of undergraduate studies [language and linguistics], 302 Morrill Hall, 255-2322), N. Pollak, M. Scammell, S. Senderovich, G. Shapiro

The Russian Major

Russian majors study Russian language, literature, and linguistics, emphasizing their specific interests. It is desirable, although not necessary, for prospective majors to complete Russian 101–102, 201–202, and 203–204 as freshmen and sophomores, since these courses are prerequisites to most of the junior and senior courses that count toward the major. Students may be admitted to the major upon satisfactory completion of Russian 102 or the equivalent. Students who elect to major in Russian should consult both Professor Carden and Professor Leed as soon as possible. For a major in Russian, students will be required to complete (1) Russian 301–302 or 303–304 or the equivalent, and (2) 18 credits from 300- and 400-level literature and linguistics courses, of which 12 credits must be in literature in the original Russian.

Certain courses may, with the permission of the instructor, be taken for one additional hour's credit. Such courses will involve a one-hour section each week with work in the Russian language. These courses count one hour each of credit toward the 12 courses of Russian literature in the original language required for the major.

Study Abroad

Cornell abroad has opened a program at the Russian Theatre Academy in Moscow for Cornell students to study the Russian language and selected topics connected with Russian culture. Further information is available from the Cornell Abroad office, 474 Uris Hall.

Cornell is an affiliated institution in the Council on International Educational Exchange program for Russian language study at Leningrad State University. Cornell students also frequently go on the American Council of Teachers of Russian program in Moscow and other Russian language programs. Opportunities are available for study during the summer, a single semester, or the full year. Further information is available from Professor Wayles Browne.

Honors. Students taking honors in Russian undertake individual reading and research and write an honors essay.

Fees. Depending on the course, a small fee may be charged for photocopied texts for course work.

Freshman writing seminar requirement. The following courses will satisfy the freshman writing seminar requirement: Russian 103, 104, 105, and 108.

Russian and Soviet Studies Major

See "Special Programs and Interdisciplinary Studies," which follows the department listings.

Russian Literature

P. Carden (director of undergraduate studies, 235 Goldwin Smith Hall, 255-8350), G. Gibian, N. Pollak, M. Scammell, S. Senderovich, G. Shapiro.

The Department of Russian Literature offers a variety of courses: some with readings in English translation, others in the original Russian, or both. The connection between Russian history, society, and literature is particularly close, so instruction and discussion in class often include a variety of topics, such as culture and intellectual history, as well as literature. Several courses are interdisciplinary, cosponsored with the departments of History, Economics, Government, Comparative Literature, etc. Students interested in majoring in Russian are strongly urged to take Russian 101–102 as soon as possible, preferably in their first year, or by their second at the latest. Russian 203–204, offered by the Department of Modern Languages and Linguistics, and Russian 201–202, offered by the Department of Russian Literature, complete basic language instruction and introduce students to literature. A further sequence of literature courses in Russian follows Russian 202.

For further information about courses and majors, see Modern Languages and Linguistics.

RUSSL 103 Freshman Writing Seminar: Classics of Russian Thought and Literature
Fall or spring. 3 credits.
Fall: M W F 10:10 or T R 10:10–11:25.
Spring: M W F 9:05 or 10:10. Staff.
Russian society has always seen its literature as having a mission important to the development of the nation. In this course we will examine Russian literature as it participates in the debate, whither Russia? We will look in particular at the conflict between the Slavophiles, those who thought Russia had its own unique destiny, and the Westernizers, those who thought Russia should look to the West for a model in its development. We will be reading such Russian authors as Turgenev, Dostoevsky, Herzen, and Solzhenitsyn in English translation. The course will examine the rhetorical means each author uses to make his argument. All reading is in English translation.

RUSSL 104 Freshman Writing Seminar: Nineteenth-Century Russian Literary Masterpieces
Fall or spring. 3 credits.
Fall: M W F 9:05 or T R 11:40–12:55. P. Carden and staff. Spring: T R 10:10–11:25 or M W F 12:20. N. Pollak and staff.
This course will introduce students to a broad selection of the major works of the Russian literary tradition. Our emphasis will be on what makes each work interesting as writing, what themes have been particularly interesting to Russians, and how we recognize the distinctive voice of each of the writers we are studying. Among the authors read are Pushkin, Gogol, Turgenev, Dostoevsky, Tolstoy, and Chekhov. All reading is in English translation.

RUSSL 105 Freshman Writing Seminar: Twentieth-Century Russian Literary Masterpieces
Fall or spring. 3 credits.
Fall: T R 2:55–4:10. Spring: M W F 11:15. Staff.
Russian literature in the twentieth century has endured many ups and downs. At times it has produced great masterpieces of modern art. At times it has been forced into the dry mode of "socialist realism," in which it had to voice the ideas forced upon it by a totalitarian government. Russian authors have been glorified as the voice of the nation, and they have also perished in concentration camps in the far north of Siberia. In this course we will read a representative selection of these authors, including those who took the path of art, those who bent to the "social command," and those who assumed a politically dissident stance. Among the authors read will be Babel, Pasternak, Olesha, and Solzhenitsyn. All reading is in English translation.

[RUSSL 108 Freshman Writing Seminar: 100 Years of Russian Fiction (1830–1930)
Fall. 3 credits. Not offered 1992–93.
M W F 10:10. N. Pollak.
What is the "truth" of the work of fiction? Native responses to Russian literature in the nineteenth and twentieth centuries have included two apparently antithetical—and passionately proclaimed—responses to this question. According to one view, that truth lies in the ideal content of the work, its fidelity to "objective" reality, and its social relevance. According to the other view, which arose in part as a response and counterweight to the first, the truth is inseparable from the stylistic aspects of the work. In reading short fiction by such writers as Pushkin, Gogol, Tolstoy, Chekhov, and Babel, we will attempt to examine the ways each of them asserts his conception of the truth—and the ways these approaches must overlap in the determination of the complex truth that is the work of art.]

RUSSL 201–202 Readings in Russian Literature #
201, fall; 202, spring. 3 credits each term.
Prerequisites: qualification in Russian; 201 is prerequisite to 202. Open to freshmen.
Fall: M W F 1:25, G. Shapiro; or M W F 2:30, N. Pollak. Spring: M W F 1:25, N. Pollak.
These courses are designed as the initial courses students take after qualification in Russian and are conducted mainly in Russian. Considerable guidance is provided, however, and there is no presumption of fluency. The goals of the courses are to introduce students to Russian literature in the original, to sample differing literary styles, and to accomplish both with minimal recourse to English in class. Several short papers in Russian and English will be assigned. Readings from nineteenth- and twentieth-century masters of prose and verse such as Pushkin, Lermontov, Tiutchev, Tolstoy, Chekhov, Babel, and Zoshchenko.

[RUSSL 207 Themes from Russian Culture #
Spring. 3 credits. Not offered 1992–93.
M W F 1:25–2:15. G. Shapiro.
This course is based on lectures, discussions, and audio-visual presentations (slides, tapes, films). It includes within its scope various aspects of Russian culture such as literature, art, music, religion, philosophy, and social thought from its very beginnings through the eighteenth century. The course is designed to

give undergraduates a broad familiarity with the cultural traditions of the country which plays a major role in the world today. Russian culture will be presented as part of Western civilization with attention given to its distinctive character. The basic texts are literary works of moderate length in English translation.]

RUSSL 208 Themes from Russian Culture II
Spring. 3 credits.
M W F 1:25. G. Shapiro.
This course is based on lectures, discussions, and audiovisual presentations (slides, tapes, films). It includes various aspects of Russian culture such as literature, art, music, religion, philosophy, and social thought over the last two hundred years. The course is designed to give undergraduates a broad familiarity with the cultural traditions of the country that plays a major role in the world today. Russian culture will be presented as part of Western civilization with attention given to its distinctive character. The basic texts are literary works of moderate length in English translation.

[RUSSL 314 Intellectual Background of Russian Literature, 1825–1930 #
Not offered 1992–93.]

[RUSSL 329 Eastern Europe Today: Economics, Government, Culture (also Economics 329 and Government 326)
Fall. 4 credits. Not offered 1992–93.
T R 2:55–4:10. G. Gibian, M. Rush, G. Staller.
Introductory interdisciplinary survey of Poland, Hungary, Czechoslovakia, and Yugoslavia since World War II, with emphasis on contemporary developments. The goals of the course are to examine differences among East European countries as well as common elements.]

[RUSSL 330 The Soviet Union: Politics, Economics, and Culture (also Economics 330 and Government 330)
Spring. 4 credits. Not offered 1992–93.
T R 2:55–4:10. G. Gibian, M. Rush, G. Staller.
Interdisciplinary survey of the U.S.S.R. since the Revolution, with emphasis on contemporary developments.]

RUSSL 331 Introduction to Russian Poetry #
Fall. 4 credits. Prerequisites: Russian 202 or equivalent and permission of instructor. This course may be counted toward the 12 credits of Russian literature in the original language for the Russian major. Also open to graduate students.
T R 1:25–2:40. S. Senderovich.
A survey of Russian poetry with primary emphasis on the analysis of individual poems by major poets.

RUSSL 332 Russian Drama and Theatre
Fall. 4 credits.
T R 2:55–4:10. S. Senderovich.
Selected topics. Discussion of a number of the most representative Russian plays of the nineteenth and twentieth centuries in chronological order. Introductions to the historical period, cultural atmosphere, literary trends, and crucial moments in the history of the Russian theater will be especially emphasized. Among the works we will be studying will be Gogol's *Inspector General*, Ostrovsky's *The Storm*, and Chekhov's *The Cherry Orchard*. All readings will be in English translation. Additional assignments in critical literature will be made for graduate students.

[RUSSL 333 Twentieth-Century Russian Poetry
Spring. 4 credits. Not offered 1992–93.
T R 11:40–12:55. N. Pollak.
Close readings of lyrics by major twentieth-century poets. All reading is in Russian. Geared towards undergraduates.]

[RUSSL 334 The Russian Short Story #
Spring. 4 credits. Prerequisites: Russian 202 or equivalent and permission of instructor. This course may be counted toward the 12 credits of Russian literature in the original language for the Russian major. Also open to graduate students. Not offered 1992–93.
T R 1:25–2:40. M. Scammell.
A survey of two centuries of Russian story telling. Emphasis on the analysis of individual stories by major writers, on narrative structure, and on related landmarks of Russian literary criticism.]

[RUSSL 335 Gogol #
Spring. 4 credits. There may be a special section for students who read Russian; if they are Russian majors, they may count this course as one in the original language. Also open to graduate students. Not offered 1992–93.
M W 2:30–3:45. Staff.
Selected works of Gogol read closely and viewed in relation to his life and to the literature of his time. Readings in English translation.]

RUSSL 350 Education and the Western Literary Tradition (also Comparative Literature 350 and College Scholar 350) #
Spring. 4 credits.
T R 2:55–4:10. P. Carden.
A major philosophical tradition has conceived of education as encompassing the whole of our lives. What we should do or be is seen as the result of every choice we make. The whole of our human contacts is understood as a school in which we form ourselves. This all-encompassing vision of education has been embodied in the works of the great philosopher-fantasts who use the forms of fiction to explore fundamental issues of education. In this course we will examine several key philosophical fantasies, among them Plato's *Republic*, Rousseau's *Emile*, and Tolstoy's *War and Peace*. Our aim will be to understand how the discourse on education became a central part of our Western tradition.

[RUSSL 367 The Russian Novel (also Comparative Literature 367) #
Spring. 4 credits. Also open to graduate students. Special discussion section for students who read Russian. Not offered 1992–93.
T R 10:10–11:25. G. Gibian.
Sentimentalism, Romanticism, Realism, Impressionism, Modernism. Novels and short stories by Gogol, Turgenev, Tolstoy, Dostoevsky, Chekhov, and others. Readings in English translation.]

[RUSSL 368 Soviet Literature from Revolutionary Times to "Glasnost"
Fall. 4 credits. Also open to graduate students. There will be a special section for students who read Russian. Not offered 1992–93.
T R 1:25–2:40. M. Scammell.
An introductory survey of Soviet literature, beginning with the revolutionary fervor of the twenties, continuing through the dark days of the thirties and the war years of the forties, and ending with an account of Khrushchev's "thaw," the rise of the dissident movement and the introduction of "glasnost." Writers and movements to be discussed include Mayakovsky and the Futurists; Zamyatin, Platonov and anti-utopian fiction; Gorky and Socialist Realism; Gulag literature; Pasternak; Solzhenitsyn and the dissidents; the meaning of "glasnost."]

[RUSSL 369 Dostoevsky (also Comparative Literature 383) #
Fall. 4 credits. Not offered 1992–93.]

[RUSSL 371 Literature of the Third Wave
Spring. 4 credits. Not offered 1992–93.
M W 11:15 plus 1 hour to be arranged. M. Scammell.
The literature of the "third emigration." A survey of recent Russian literature by writers who have voluntarily or involuntarily left the Soviet Union during the past fifteen years. Among the authors discussed will be Solzhenitsyn, Sinyavsky, Brodsky, Zinoviev, Sokolov, Aksyonov, Voinovich, Limonov, Vladimov, Maximov, Aleshkovsky, Dovlatov, and Gorbanevskaya. Some consideration will be given to the influences of emigré publishing houses and literary magazines on the development of contemporary Russian literature and literary and political issues being debated by emigré literary circles.]

RUSSL 373 Chekhov in the Context of Contemporary European Literature and Art (also Comparative Literature 395) #
Spring. 4 credits.
T R 1:25–2:40. S. Senderovich.
Reading and discussion of Anton Chekhov's short stories in the context of the European art of the short story and painting of that era. The course is designed for nonspecialists as well as literature majors. All reading is in English translation.

[RUSSL 375 Literature of the Soviet Period, 1917–1945
Fall. 4 credits. Prerequisite: permission of instructor. Also open to graduate students. Russian majors may do part or all of the reading in Russian by prior agreement with the instructor. Not offered 1992–93.
T R 11:40–12:55. M. Scammell.
A survey of the development of Russian literature during the second quarter of the twentieth century, with the emphasis on attempts to create a purely Soviet literature but also taking into account the achievements of non-Soviet writers, including emigrés and the so-called fellow travelers.]

[RUSSL 376 Literature of the Soviet Period, 1945–1985
Spring. 4 credits. Prerequisite: permission of instructor. Also open to graduate students. Russian majors may do part or all of the reading in Russian by prior agreement with the instructor. Not offered 1992–93.
T R 11:40–12:55. M. Scammell.
A survey of the development of Soviet literature after World War II, including the thaw, the literature of the Gulag, the rise of the dissident movement, and the creation of the "third emigration."]

[RUSSL 379 The Russian Connection (also Comparative Literature 379) #
Spring. 4 credits. Not offered 1992–93.
T R 2:55–4:10. P. Carden.
Our topic will be the development of a poetics of introspection in European prose in the course of the 19th century, culminating in two major Russian novels: Tolstoy's *War and Peace* and Dostoevsky's *The Idiot.* Among other works we will read: Constant's *Adolphe*, Stendhal's *Charterhouse of Parma*, and several short works relevant to the theme.]

RUSSL 380 Soviet Dissident Literature—Its Role in the Collapse of the USSR
Fall. 4 credits.
T R 1:25–2:40. M. Scammell.
A study of the dissident movement 1963–83. Defining the varieties of dissidence: literary, cultural, religious, and political. Literature as a social force as seen in the works of Pasternak, Solzhenitsyn, Sinyavsky-Tertz, Voinovich, Zinoviev. The role of the third emigration in forcing change. The course is intended for students of government as well as of Russian and Soviet literature.

RUSSL 385 Reading Nabokov (also Comparative Literature 385 and English 379)
Spring. 4 credits.
M W F 2:30. G. Shapiro.
This course offers an exciting trip to the intricate world of Nabokovian fiction. After establishing himself in Europe as a distinguished Russian writer, Nabokov, at the outbreak of WWII, came to the United States where he reestablished himself, this time as an American writer of world renown. In our analysis of the Nabokovian artistic universe, we shall focus on his two splendid achievements as a Russian writer, *Invitation to a Beheading* (1935–36) and *The Gift* (1937–38) (both in their English form), and then examine the two widely read novels that he wrote in Ithaca while teaching literature at Cornell—*Lolita* (1955) and *Pnin* (1957). Course enrollment will be limited to 25.

[RUSSL 388 Ideas and Form in Novels of Social Inquiry (also Comparative Literature 388)
Spring. 4 credits. Not offered 1992–93.
M W F 9:05. G. Gibian.
From the French Revolution to the present. Problems of relations between politics and the writer. Literary representations of conflict between political ideologies (ideas of revolution, justice, nationalism) and private needs (art, nature, love, order). Marx, Flaubert, Dostoevsky, Conrad, Trotsky, Lenin, V. S. Naipaul, Richard Wright, Solzhenitsyn, Kundera, and others. Some poetry will also be included.]

[RUSSL 389 Modern Literature in Poland, Czechoslovakia, Hungary, and Yugoslavia (also Comparative Literature 389)
Spring. 4 credits. Not offered 1992–93.
T R 11:40–12:55. G. Gibian.
The course will focus on novels and short stories, but some consideration will also be given to drama and poetry. No knowledge of Eastern European languages is required; the reading will be done in English translation. Primary emphasis will be on the texts as literary works of art, but attention will also be given to historical and political background.]

[RUSSL 390 The Power of Nationalism: Expressions of National Feelings in Politics, Literature, History, and the Arts (also Comparative Literature 390)
Fall. 4 credits. Not offered 1992–93.
T R 2:55–4:10. G. Gibian and others.
The course will deal with various aspects of the general subject of national identity and feeling. In addition to studying the political phenomenon of nationalism, we will also study the roles played by national awareness in the perception of one's identity, the self-images of national character, stereotypes of national and ethnic qualities, and the relation between a sense of belonging to a nation and various other groups. Case studies of several nations and ethnic groups. There will be guest lecturers.]

RUSSL 393 Honors Essay Tutorial
Fall or spring. 4 credits.
Hours to be arranged. Staff.

[RUSSL 400 Reading the Great Tradition #
Spring. 4 credits. Prerequisite: Russian 202 or equivalent. Recommended: a course at the 300 or 400 level in which reading has been done in Russian. This course may be counted toward the 12 credits of Russian literature in the original language required for the Russian major. Not offered 1992–93.
T R 11:40–12:55. S. Senderovich.
The course is designed to improve the reading facility of advanced undergraduates and beginning graduate students who will read their first novel in Russian, while paying close attention to stylistic qualities.]

[RUSSL 409 Russian Stylistics
Fall. 4 credits. Not offered 1992–93. Also open to graduate students. Prerequisite: three years of Russian.
T R 1:25–2:40. S. Senderovich.
A few steps beyond normative grammar. Introduction to the subtleties of idiomatic Russian on the levels of morphology, syntax, vocabulary, and phraseology. Introduction to the genres of live colloquial and written language. Development of writing skills through short assignments and their analyses. First notions of literary stylistics and their practical application.]

[RUSSL 415 Postsymbolist Russian Poetry
Spring. 4 credits. Open to graduate students. Prerequisite: permission of instructor. Not offered 1992–93.
M W 2:30–4. N. Pollak.
We will examine works by three poets in the first quarter of this century: Innokentij Annenskij, the Symbolist whom the Acmeists considered their mentor; Osip Mandelstam, a founding Acmeist; and Boris Pasternak, associated, at least for a time, with the Futurists. Through close readings of their verse, and also critical prose and manifestos, we will attempt to determine some of the general features that link poets of such diverse orientations in the years following the crisis of Symbolism. We will also outline the features that distinguish them as representative of their respective movements.]

RUSSL 431 Contemporary Russian Prose
Spring. 4 credits. Prerequisites: Russian 301–302 or 303–304, and permission of instructor. This course may be counted towards the 12 credits of Russian literature in the original language for the Russian major. Graduate students may audit the course.
T R 11:40–12:55. G. Gibian.
This course is designed to acquaint students with the way Russian prose has developed during the past forty years. Although the emphasis will be on comprehension of the text, we will also discuss literary methods, modern literary history, social and political problems, and the ways in which life in the Soviet Union is reflected in its literature. Authors to be read include Viktor Nekrasov, Yuri Kazakov, Alexander Solzhenitsyn, Varlam Shalamov, Abram Tertz (Andrei Sinyavsky), Vasili Axyonov, and Tatyana Tolstaya. This course is specifically intended for third- and fourth-year Russian majors.

[RUSSL 432 Pushkin #
Spring. 4 credits. Prerequisites: Russian 202 or equivalent, and permission of instructor. This course may be counted towards the 12 credits of Russian literature in the original language for the Russian major. Also open to graduate students. Not offered 1992–93.
T R 11:40–12:55. G. Gibian.
Reading in the original language and discussion of selected works by Pushkin: lyrics, narrative poems, and *Eugene Onegin.*]

RUSSL 491 Reading Course: Russian Literature in the Original Language
Fall or spring. 1 credit each term. Prerequisite: permission of instructor.
Hours to be arranged. Staff.
This course is to be taken in conjunction with any Russian literature course in English translation. Students will receive one credit for reading and discussing works in Russian in addition to their normal course work.

RUSSL 492 Supervised Reading in Russian Literature
Fall or spring. 1–4 credits each term.
Hours to be arranged. Staff.

RUSSL 498 Russian Symbolism (also 698)
Fall. 4 credits.
W 3:35–5:35. P. Carden.
Around 1886 the trends in French culture represented by Baudelaire and Mallarme crystallized into a new cultural movement, called in some of its aspects the Decadence and in others Symbolism. The new sentiments about the nature of art spread throughout Europe, drawing in England, the Scandinavian countries, Germany, and Russia. The first stirrings of Symbolism were in the ascendant in Russian cultural life and it remained the dominant force until 1910. Our task will be to study the phenomenon of Symbolism as it touched the arts in Russia, including not only literature, but dance, theater, and the visual arts. Since Symbolism was a movement that cut across national boundaries, we will study the seminal works of European art that created the climate in which Russian Symbolism was conceived and came to maturity.

RUSSL 499 Russian Modernism (also 699)
Spring. 4 credits.
W 3:35–5:35. P. Carden.
We will be investigating the rich and innovative period of the avant-garde in Russia from 1910 to 1925. In addition to examining outstanding works in a variety of forms, we will look at the movements, social context, and ties to the European avant-garde. Among the writers whose works we will examine are Blok, Bely, Mayakovsky, Khlebnikov, Pilnyak and Babel. We will examine theater through the Futurist performance piece, "Victory Over

the Sun," through Meyerhold's productions of Mayakovsky's plays and other experimental pieces, and through mass spectacles. We will discuss the film theories of Eisenstein and Dziga Vertov and see several of their films. In the visual arts we will be examining the experiments of Larionov and Goncharova, Malevich, Kandinsky, and Tatlin. We will also look at the photomontage of Rodchenko.

Graduate Seminars

[RUSSL 600 Proseminar: Research Methodology in Russian Literature
Fall. 4 credits. Not offered 1992–93.
W 3:45–5:45. P. Carden.
This course is intended for graduate students beyond the first-year level who want a more advanced training in research methodology. Among the topics to be covered are the research library, its resources and obstacles; bibliography of Russian literature and culture; Russian archives, what they contain and how to use them; finding and evaluating information; reading criticism analytically; evaluating different editions of an author's works; editing and revising a paper to meet professional standards of cogency and format. Each student should be working concurrently on a paper, which might be an upgrading of a seminar paper, a draft of the master's essay, or a chapter of the dissertation.]

[RUSSL 603 Graduate Seminar: Neglected Masterpieces of Short Russian Prose
Spring. 4 credits. Not offered 1992–93.
T R 2:55–4:10. G. Gibian.
Nineteenth- and twentieth-century works chosen according to the needs of the students enrolled. Stress on skills useful in teaching Russian literature.]

RUSSL 611 Supervised Reading and Research
Fall or spring. 2–4 credits. Prerequisite: permission of the department.
Hours to be arranged. Staff.

[RUSSL 615 Postsymbolist Russian Poetry
Not offered 1992–93.
For description see Russian 415.]

[RUSSL 617–618 Russian Stylistics I and II
Not offered 1992–93.]

[RUSSL 619 Seventeenth-Century Russian Literature
Fall. 4 credits. Not offered 1992–93.
W 3:35–5:35. G. Shapiro.
Seventeenth-century Russian literature is often studied together with Medieval literature. Is such an arrangement justified, or does seventeenth-century literature have its own problematic that makes it worth studying separately? In scholarship the seventeenth century is referred to as the Age of Baroque. Did Muscovite Russia experience its own Baroque, and, if so, what are its unique features? These and other important issues will be addressed in the seminar. In the course of the seminar a variety of concepts, genres, and themes characteristic for the epoch will be discussed. We will read the works of such authors as Simeon Polotsky, Silvester Medvedev, Karion Istomin, and the archpriest Avvakum.]

[RUSSL 620 Twentieth-Century Russian Poetry
Spring. 4 credits. Not offered 1992–93. Open to advanced undergraduates with permission of instructor.
W 3:35–5:35. N. Pollak.
An in-depth study of the writings of selected twentieth-century poets. Authors may include Blok, Mandelstam, Pasternak, Tsvetayeva, and Khlebnikov.]

[RUSSL 621 Old Russian Literature
Fall. 4 credits. Not offered 1992–93.
T 4:15–6:15. S. Senderovich.
A survey.]

RUSSL 622 Eighteenth-Century Literature
Spring. 4 credits.
T 4:15–6:15. S. Senderovich.
Introduction to the first century of modern Russian literature. Cultural identity of the age: Baroque, Neo-Classicism, Enlightenment, Sentimentalism. Reading of representative texts of the major writers of the century: Trediakovsky, Lomonosov, Sumarokov, Novikov, Karamzin, etc. Main connections with nineteenth-century literature: roots, evolution, intertextuality.

[RUSSL 623 Early Nineteenth-Century Literature
Not offered 1992–93.]

[RUSSL 624 Russian Romanticism
Fall. 4 credits. Taught in Russian. Not offered 1992–93.
R 4:15–6:15. S. Senderovich.
A survey of concepts, themes, genres, and main individual contributions in Russian literature of the Age of Romanticism. The Age of Romanticism encompasses the first four decades of the nineteenth century. Zhukovsky, Batiushkov, Pushkin, Baratynsky, Gogol, and Lermontov are the major representatives of this style and the most important period of Russian literature. The emphasis is on poetry, its historical and theoretical problems. It was, above all, the golden age of Russian poetry, which prepared and deeply influenced the following age of great Russian prose. Turgenev, Tolstoy, Dostoevsky, and Chekhov are full of allusions to the texts of the golden age and cannot be properly understood without it.]

[RUSSL 625 Russian Realism
Spring. 4 credits. Also open to advanced undergraduates with permission of instructor. Not offered 1992–93.
W 3:35–5:35. P. Carden.
A study of the development of psychological realism in Russian prose of the nineteenth century, with some attention to the poetic tradition. In addition to reading representative works, we will pay attention to the historical background of the period. We will approach the works through the critical writings of several important theorists, in particular those of Lydia Ginzburg.]

[RUSSL 626 The Tradition of Russian Poetry
Spring. 4 credits. Not offered 1992–93.
F 2:30–4:30. N. Pollak.
This course will examine a selection of poems that have been particularly important for the tradition of Russian literature in the nineteenth and twentieth centuries. Our focus will include critical and literary responses to these poems as well as close readings.]

[RUSSL 630 Gogol
Spring. 4 credits. Not offered 1992–93.
Taught in Russian.
W 4:15–6:15. G. Shapiro.
Gogol's artistic career from his "Ukrainian" cycles to *Dead Souls.* We will examine representative works from each of the major divisions of Gogol's early work, in particular from his cycles *Evenings on a Farm near Dikanka and Mirgorod,* and will trace the writer's development toward his magnum opus, *Dead Souls.* Although some of the readings will be done in English to enable the class to cover a significant amount of material, the class work will be focused on close analysis of the Russian text.]

[RUSSL 635 Russian Literary Criticism of the Twentieth Century (also Comparative Literature 635)
Fall. 4 credits. Not offered 1992–93.
W 3:35–5:35. P. Carden.
A survey of twentieth-century Russian contributions to critical theory and practice. Texts by the symbolists, the formalists, the school of Bakhtin, the folklorists, and the structuralists will be read and analyzed. A reading knowledge of Russian is desirable, although alternative readings in English translation can be arranged for otherwise qualified students.]

[RUSSL 650 Russian Intellectual History
Spring. 4 credits. Not offered 1992–93.
R 4:15–6:15. S. Senderovich.
Nineteenth- and twentieth-century selected topics. Taught mostly in English.]

[RUSSL 669 Seminar: Dostoevsky
Fall. 4 credits. Not offered 1992–93. Also open to advanced undergraduates.
R 4:15–6:15. G. Gibian.
Study of representative works from various periods of Dostoevsky's life, from *Poor Folk* and *The Double* to *The Brothers Karamazov,* including some articles, speeches, and parts of *The Diary of a Writer* against the context of nineteenth-century Western European and Russian literature. A variety of critical and scholarly approaches (from Russian formalists to 1980s Western scholars) will be sampled and evaluated.]

[RUSSL 671 Seminar in Nineteenth-Century Russian Literature
Fall. 4 credits. Not offered 1992–93.
T 4:15–6:15. G. Gibian.
Topic: Distinctive Russian kinds of narrative. Dostoevsky and others.]

RUSSL 672 Seminar in Twentieth-Century Russian Literature
Fall. 4 credits. Open to advanced undergraduates.
M 4:30–6:30. N. Pollak.

[RUSSL 673 The Russian Nabokov
Fall. 4 credits. Not offered 1992–93. Also open to advanced undergraduates.
R 4:15–6:15. M. Scammell.
Vladimir Nabokov wrote much verse, several plays, numerous short stories, and nine novels in Russian before switching to English. He is a major Russian writer of the twentieth century. This seminar will examine his work in the context of modern Russian literature, concentrating in particular on the novels. Knowledge of Russian is highly desirable, but all the works discussed also exist in English translation.]

RUSSL 674 Solzhenitsyn and the Literature of the Gulag
Fall. 4 credits.
T 4:15. M. Scammell.

RUSSL 675 Russian Literature, 1917–1945
Fall. 4 credits.
F 2:30–4:30. G. Shapiro.
This semester will focus on the achievements of Russian prose between the two World Wars. Among the authors whose works will be closely read and discussed, there are Babel, Olesha, Zoshchenko, Ilf and Petrov, Bulgakov, and Nabokov.

RUSSL 676 Russian Literature, 1945–Present
Spring. 4 credits.
R 4:15–6:15 p.m. G. Gibian.

RUSSL 698 Russian Symbolism
Fall. 4 credits.
W 3:35–5:35. P. Carden.
For course description, see 498.

RUSSL 699 Russian Modernism
Spring. 4 credits
W 3:35–5:35. P. Carden.
For course description, see 499.

[RUSSL 701 Proseminar: Methods in Research and Criticism
Not offered 1992–93.]

SANSKRIT

See Department of Modern Languages and Linguistics.

SERBO-CROATIAN

See Department of Modern Languages and Linguistics.

SOCIOLOGY

R. L. Breiger, chair; E. Bell, S. Caldwell, J. Freeman, D. P. Hayes, R. McGinnis, P. Moen, V. Nee, B. C. Rosen, D. Stark, D. Strang, J. M. Stycos, N. B. Tuma, H. A. Walker, R. M. Williams, Jr., K. X. Zhou.

The subject matter of sociology is human social organization and institutions. The Department of Sociology offers courses in social organization that include (among other issues) examination of inequality on the basis of race, ethnicity, income, and occupation; political behavior and public policy; relations and affect in small groups; and contemporary social movements for change. Courses that analyze institutions include the family, politics and issues of public policy, the analysis of voluntary organizations, and the study of networks of political and organizational action.

The Department of Sociology offers the opportunity to develop fundamental theoretical insight and advanced research skills appropriate for the study of social behavior and institutions. Graduates of the department take up careers in university, government, and business settings and in law, management, architecture, and other professions seeking men and women who demonstrate a disciplined understanding of society and social issues.

Sociology Courses for Nonmajors

The social sciences provide students with particularly effective ways to understand the complexities of modern life. For many students, the undergraduate years are a last opportunity to gain the insights these fields have to offer. The Department of Sociology is continuing to design an array of beginning and advanced courses that convey a broad understanding of the methods and insights of sociological analysis—courses that will be of particular interest to undergraduates who may not major in sociology. First- and second-year students should note that the introductory courses (101, 103, 104, 110, 115) provide substantial focus on the sociological analysis of major issues of public life. A wide selection of general education courses is available at the 200 level. Advanced undergraduates who are majors in other fields should also see, in particular, the descriptions of Sociology 366 (fall), Sociology 360 and 385 (spring), for which there are no prerequisites other than junior or senior status.

Related Courses in Other Departments

Students interested in sociology should consult the course lists of the other social science departments in the College of Arts and Sciences (including Anthropology, Economics, Government, and Psychology) and of these other departments: Organizational Behavior (College of Industrial and Labor Relations), Human Development and Family Studies (College of Human Ecology), and Rural Sociology (College of Agriculture and Life Sciences).

The Major

Requirements for general sociology: (1) 101 and any other 100-level course (excluding Freshman Writing Seminar) with a 2.5 minimum grade-point average; (2) no later than the junior year, the 301 and 303 methods courses; (3) one course in the department at the 400 level or higher (491 is recommended); and (4) 20 additional credits in sociology, of which 9 may be taken in related departments if approved by the student's adviser.

Requirements for honors: Potential honor students are encouraged to begin taking the methods and statistics courses during their sophomore year and to take at least 2 credits of Sociology 491, Independent Study, during their junior year. Honors students take Sociology 495–496 during their senior year. Graduation with honors requires a cumulative average of at least B+ in all sociology courses and the successful completion of an oral defense of the honors thesis. Interested students should consult the director of undergraduate studies no later than the second semester of their junior year.

Cornell-in-Washington program. Qualified sociology majors may include a semester in the Cornell-in-Washington program, in which students take courses and undertake a closely supervised internship. For further information, see p. 23.

Supervised research. Qualified sociology majors are invited to participate with faculty members in conducting research. Such projects are usually initiated in one of two ways: the student may offer to assist the faculty member in an ongoing project, or the student may request that the faculty member supervise the execution of a project conceived by the student. In either case the student should enroll in Sociology 491. Interested students may direct inquiries to any faculty member.

Society and Economy Concentration

Sociology majors or students in other disciplines who wish to prepare for graduate study in any of the social sciences or in a profession (business, management, or law) may elect to acquire a concentration in society and economy (including international dimensions). This program is designed to provide training in economic sociology, formal organizations, and social science methods. The requirements for the concentration in society and economy include courses in economic sociology, formal organizations, and methods. For further information, consult Professor Victor Nee, 330 Uris Hall.

Introductory Couses

SOC 101 Introduction to Sociology
Fall. 3 credits.
W F 10:10–11 plus one sec. H. A. Walker.
This course provides an introduction to theory and research in sociology. It demonstrates how the insights, theories, and methods of sociological analysis can be brought to bear on major issues of social life. A primary goal is to convey a sense of the manner in which sociologists formulate theories and how the collection and analysis of data are used to evaluate those theories. The course will provide "hands-on" experience in analyzing sociological issues. Students undertake guided research exercises that involve using computers to analyze actual data. No prior background is presumed; necessary skills are covered in class and section meetings.

SOC 103 Introduction to Sociology: Microsociology
Fall. 3 credits.
M W F 9:05–9:55. D. P. Hayes.
An introduction to microsociology, focusing on concepts and theory of social processes within small groups, including the family. Emphasis is on leadership, conformity, social influence, cooperation and competition, distributive justice, and micro analyses of interaction.

SOC 104 Race and Ethnic Relations
Fall. 3 credits.
W F 1:25–2:15 plus one section.
H. A. Walker.
This course focuses on race and ethnic relations in contemporary perspective. It examines the social and behavioral implications of attributions of race and ethnicity in small group interaction, the world of work, and the larger society. Topics: inequalities in income and employment, affirmative action, ethnic political mobilization, patterns of marriage and family formation.

SOC 110 Introduction to Economy and Society
Spring. 3 credits.
V. Nee.
Modern social thought arose out of attempts to explain the relationship between economic development and the social transformations that gave rise to the contemporary world. Classical theorists from Karl Marx and Max Weber to Karl Polanyi focused their writings on emergent capitalist economies and societies. Contemporary social theorists likewise have sought to understand the interaction between capitalism and the social forces reacting against and emerging from

modern economic development. From exchange and rational choice theories to network analysis and institutional theory, a central theme in contemporary social thought has been the relationship between the economy and society, economic action and social structure, rationality and fundamental social processes. This course provides an introduction to social thought and research seeking to understand and explain the relationship between economy and society in the modern era.

SOC 115 Utopia in Theory and Practice
Spring. 3 credits.
D. Strang.
This course examines imaginings of the "ideal society" and efforts to realize them. We discuss the classic literary utopias, from Plato's *Republic* to More's *Utopia* to Bellamy's *Looking Backward*, and also the dystopias of Huxley and Orwell. We also examine social experiments like the nineteenth-century American intentional communities, various socialisms, and the design of contemporary political constitutions. Throughout, the emphasis is on two sociological questions. What leads people to conceive of particular social arrangements as ideal? How can we tell social structures that can work from those that cannot?

General Education Courses

SOC 205 Population Dynamics (also Rural Sociology 201)
3 credits.
J. M. Stycos.
An introduction to population studies, which includes the determinants and consequences of population change. The primary focus is on the influences of demographic dynamics on society and the economy, with emphasis on marriage, family formation, mortality, crime and deviance, migration, and marketing behavior.

SOC 240 Personality and Social Change
Spring. 3 credits.
B. C. Rosen.
An analysis of social and psychological factors that affect and reflect social change. Topics to be examined will include models of man and society, national character, modern melancholy, feminism, family and sex roles, industrialism, economic development, and psychocultural conflict.

[SOC 243 Family
3 credits. Not offered 1992–93.
B. C. Rosen.]

SOC 265 Hispanic Americans (also HASP 265)
Spring. 3 credits (4-credit option available).
H. Velez.
Exploration and analysis of the Hispanic experience in the United States. An examination of sociohistorical background and economic, psychological, and political factors that converge to shape a Hispanic group identity in the United States. Perspectives are suggested and developed for understanding Hispanic migrations, the plight of Hispanics in urban and rural areas, and the unique problems faced by the diverse Hispanic groups. Groups studied include Mexican Americans, Dominicans, Cubans, and Puerto Ricans.

SOC 275 Women at Work
Spring. 3 credits.
E. Bell.
This course will examine the role women play in the labor force with a focus on more developed countries. We will look at the relationship between women's paid and unpaid work, considering various alternative explanations ranging from Marxist feminism to rational choice in order to better understand the changes over the past several decades.

SOC 283 Groups and Relationships (also Psychology 283)
Summer (six week) session. 4 credits.
M W 7–10 p.m. L. Meltzer.
Small groups (such as teams and committees) and dyadic relationships (such as friends and lovers) are studied via games, exercises, and demonstrations. An out-of-class group project involving self-study is an integral part of the course. The goals are increased sensitivity to group processes, heightened awareness of the effects we have on others, and an understanding of how person-to-person processes relate to larger societal phenomena.

SOC 285 Social Psychology of Political and Economic Modernization
Fall. 3 credits.
T R 1:25–2:40. B. Rosen.
This course analyzes the changes taking place in newly industrializing countries around the world. It seeks to increase the student's understanding of the psycho-social forces that cause social change by modifying social behavior and personality. Particular attention will be paid to the roles of industrialization, social behavior, and emotional needs in the modernization process.

[SOC 290 Social Psychology of Interpersonal Relations
Spring. 3 credits. Not offered 1992–93.
H. A. Walker.
The focus of this course is on the relationship between the individual and the social group. It will examine the way in which the individual shapes "society," and in turn, how society influences individual behavior. Topics include formation of self, influence and conformity, and the emergence of racial and gender differences in status and power.]

Methods and Statistics Courses

SOC 301 Evaluating Statistical Evidence
Fall. 4 credits.
M W 11:15–12:05, plus one section.
R. L. Breiger.
A first course in statistical evidence in the social sciences, with emphasis on statistical inference and multiple regression models. Theory is supplemented with numerous applications.

SOC 303 Design and Measurement
Spring. 4 credits. Prerequisite: a course in sociology.
D. P. Hayes.
Foundations of sociological analysis; issues arising from using humans as data sources; the quality of our primary data; methods of its collection; research designs in wide use and their limitations; pragmatic considerations in doing research on humans, organizations, communities, and nations.

Intermediate Courses

[SOC 310 Sociology of War and Peace
Fall. 4 credits. Not offered 1992–93.
R. M. Williams, Jr.
Every human group, community, or society presents many examples of altruism, helping, cooperation, agreement, and social harmony. Each grouping or society also manifests numerous examples of competition, rivalry, opposition, disagreement, conflict, and violence. Both conflict and cooperation are permanent and common aspects of the human condition. Collective conflicts, especially wars and revolutions, are frequent and dramatic events. But "peace" and "war" are equally active social processes, not passive happenings. This course describes various commonly accepted but erroneous notions of the causes and consequences of war and deterrence. It deals with the major theories concerning the sources of war in international and intranational social systems. The last half of the course analyzes the modes, techniques, and outcomes of efforts to restrict, regulate, and resolve international conflicts.]

[SOC 315 Sociology and Politics of Science
3 credits. Not offered 1992–93.
R. McGinnis.
This course explores the social structure of science, career patterns of scientists, and the role of government in shaping and continuing them.]

[SOC 345 Gender Inequality
4 credits. Not offered 1992–93.
H. A. Walker.
Gender inequality in contemporary perspective; emphasis on social origins of gender categories and implications of gender status for collective and individual behavior. Topics include inequalities in interpersonal relations, the family and work organizations, and implications of gender inequality for family violence, sexual harassment, and rape.]

[SOC 351 Research Seminar on Organizations
4 credits. Not offered 1992–93.
D. Strang.
This course will be structured around a group research project on organizations in the local area. Students will help to design the research strategy, conduct the research, and interpret their findings. An introduction to sociological theory and research on the role of organizations in modern life.]

SOC 360 State and Society in Comparative Perspective
Spring. 3 credits.
K. Zhou.
Variations and dimensions of the state-society relationship and the relative strength of the state vs. society in different types of regimes. The emphasis is on "weapons of the weak"—citizenship, interest groups, social mobilization, everyday forms of resistance, collective inaction, and their effects on the state and political stability. The Western democratic polity is used as the reference category to compare and contrast selected cases in Latin America, Asia, and Eastern Europe.

[SOC 365 Comparative Perspectives on Socialist Societies and Economies
3 credits. Open to juniors and seniors in any department. No prerequisites. Not offered 1992–93.
V. Nee.]

SOC 366 Transitions From State Socialism
Fall. 4 credits.
T R 1:25–2:40. D. Stark.
This course examines the rise, stagnation, and eventual fall of state socialism in East Central Europe. It compares the emergence of spheres of social activity autonomous from the

state in Poland, Hungary, and Czechoslovakia and analyzes the problems and prospects of democratic consolidation and economic transformation.

[SOC 369 Contemporary Chinese Society @
4 credits. Not offered 1992–93.
V. Nee.]

SOC 385 Personality and Society
Spring. 3 credits. Prerequisite: one course in any social science. Enrollment limited to 20 students.
B. Rosen.
A discussion seminar. Perspectives will be developed for understanding personality and behavior in a cultural context. A number of theories and conceptual approaches that have been used to understand the relationship between personality and social systems will be critically examined. Some themes in contemporary American culture will be discussed.

Advanced Courses

The following courses are intended for advanced undergraduates with substantial preparation as well as for graduate students in sociology and related disciplines. The normal prerequisite for all 400-level courses is one introductory course plus 301 (or an equivalent statistics course). Students who are not sure whether their background is sufficient for a particular course should consult the professor in charge.

SOC 414 Organizations and Public Policy
Fall. 4 credits.
T R 10:10–11:25. K. Zhou.
An introduction to the basic concepts and analytical tools for organizational analysis of public policy. The making and the evolution of public policy are examined as organizational processes. Theories of bureaucracy, organizational decision making, and implementation are applied to assess the success or failure of public policies and social programs.

SOC 420 Mathematics for Social Scientists
Fall. 2–4 credits.
M W F 12:20–2:15. R. McGinnis.
Elementary matrix algebra, probability theory, and calculus.

[SOC 426 Policy Research
4 credits. Not offered 1992–93.
S. Caldwell.
Computer models are fast becoming a permanent feature of policy making in modern government. These models can be potent instruments of politics and power as well as aids to rational decision making. After a review of the different types of computer models, this course focuses on microsimulation models, designed specifically to analyze policy consequences on individuals and families. We examine how these models have been used in important policy debates in the United States over the past two decades. Students carry out hands-on policy analyses with an actual microsimulation model operating at Cornell.]

SOC 434 The Sociology of Reproduction
Spring. 4 credits.
E. Bell.
This course will consider the social construction and control of childbearing. Topics include the medicalization and medical control of conception and childbirth, theoretical approaches to women as mothers, and the changing structural context within which women bear and rear children.

[SOC 444 Contemporary Research in Social Stratification
4 credits. Not offered 1992–93.
R. L. Breiger.
Stratification and mobility as paired concepts, requiring mutual articulation. The interplay of structure (occupational groups, labor markets, organizational demographics, social classes) and process (tracking, career trajectories, socioeconomic attainment). Recently formulated log-linear models of mobility and structure provide a central focus of the course.]

HDFS 455 Women's Choices: A Research Practicum
Fall. 4 credits. Class limited to 20 students.
T R 8:30–9:55. P. Moen.

[SOC 463 Political Sociology
4 credits. Not offered 1992–93.
D. Strang.
A seminar on the emergence of the nation-state and the state system applying comparative and historical perspectives. Open to graduate students and to advanced undergraduate students concerned with sociology, history, and political studies.]

SOC 491 Independent Study
Fall or spring. 1–4 credits. For undergraduates who wish to obtain research experience or to do extensive reading on a special topic. Permission to enroll for independent study will be granted only to students who present an acceptable prospectus and secure agreement of a faculty member to serve as supervisor for the project throughout the term. Graduate students should enroll in 891–892.

SOC 495 Honors Research
Fall or spring. 4 credits. Limited to sociology majors in their senior year. Prerequisite: permission of instructor.
Hours to be arranged. Staff.

SOC 496 Honors Thesis: Senior Year
Fall or spring. 4 credits. Prerequisite: Sociology 495.
Hours to be arranged. Staff.

SOC 497 Social Relations Seminar (also Anthropology 495)
Spring. 4 credits. Limited to seniors majoring in social relations.
Hours to be arranged. Staff.

Graduate Core Courses

These courses are primarily for graduate students in sociology but may be taken by other graduate students with permission of the instructor. Graduate students in sociology will normally take each of the five courses listed below, but with the concurrence of their special committees other arrangements may be made.

SOC 501 Basic Problems in Sociology I
Fall. 4 credits.
R 1:25–4:25. V. Nee.
Analysis of theory shaping current sociological research. Examination of several central problems in sociological inquiry provides an occasion for understanding tensions and continuities between classical and contemporary approaches, for indicating the prospects for unifying microsociological and macrosociological orientations, and for developing a critical appreciation of efforts to integrate theory and research.

SOC 502 Basic Problems in Sociology II
Spring. 4 credits.
H. A. Walker.
Continuation of Sociology 501. Emphasis is on the logical analysis of theoretical perspectives, theories, and theoretical research programs shaping current sociological research. The course includes an introduction to basic concepts used in the logical analysis of theories and examines their application to specific theories and theoretical research programs. Strategies include functionalism, social exchange, and interactionism.

SOC 505 Research Methods I: Logic of Social Inference
Fall. 4 credits. Prerequisite: a first course in statistics and probability.
M W 2:30–4:25. E. Bell.
This course is an introduction to techniques of social inference. We will cover research methods, sources of evidence, model design, and questions of empirical validity.

SOC 506 Research Methods in Sociology II
Spring. 4 credits. Prerequisite: Sociology 420 or 505 or equivalent.
K. Zhou.
A survey of methods for analyzing sociological data, including measurement error models, confirmatory factor analysis, panel models, and general structural equation methods. Readings from the sociological research literature will illustrate various methods. Periodic assignments on micro and mainframe computers will integrate theory, method, and data.

SOC 507 Research Methods in Sociology III
Fall. 4 credits. Prerequisite: Sociology 506.
M W 2:30–4:30. D. Strang and N. B. Tuma.
Models and methods for the analysis of social dynamics. The course focuses on event history analysis in the case of discrete outcomes and cross-sectional and time-series analysis in the case of continuous outcomes.

Graduate Seminars

These seminars are primarily for graduate students but may be taken by qualified advanced undergraduates who have permission of the instructor. Which seminars are to be offered any term is determined in part by the interests of the students, but it is unlikely that any seminar will be offered more frequently than every other year. The list below indicates seminars that are likely to be offered in 1991–92, but others may be added and some may be deleted. Students should check with the department before each term.

[SOC 509 Seminar on Sociology of Organizations (also Management NRE 509)
4 credits. Not offered 1992–93.
J. Freeman.
This course explores current research on organizations. The current literature can be broken up into four subareas: (1) population ecology of organizations (the class will read Hannan and Freeman, *Organizational Ecology*); (2) institutional theory; (3) organizations as mechanisms of social stratification (including work on occupational mobility and internal labor markets); and (4) economics of organization (including such topics as agency theory, transaction costs, and economic approaches to collective action). These areas will be explored in depth reflecting student interest. For each, stress will be placed on the

opportunities for empirical research and limitations of operationalization.]

SOC 510 Comparative Societal Analysis
Spring. 4 credits.
D. Stark.
This course examines contending analytic strategies for comparing institutions (and institutional configurations) across societies and social systems. How, for example, does the institutional analysis of the socialist economy contribute to our understanding of the specificities of modern capitalism? Special emphasis will be given to comparing transitions from state socialism (in Eastern Europe and elsewhere) with transitions from authoritarianism in Latin America and Southern Europe.

SOC 513 Social Networks and Social Structure
Spring. 4 credits.
R. L. Breiger.
A critical survey of theories and techniques of structural analysis in sociology, centering on the usefulness of social network analysis in providing integration of studies at different levels of generality. Applications in the areas of the sociology of organizations, community studies, social stratification, and dependence relations among nations. Emphasis on the mutual relevance of theories and operational research procedures.

[SOC 520 Field Research in Sociology
4 credits. Not offered 1992–93.
V. Nee.]

[SOC 535 Governmental Regulation of Organizations
4 credits. Not offered 1992–93.
K. Zhou.
This seminar examines the increasing impact of the modern state on industrial and occupational organizations through legislation and public policies. Main issues include: the life chances of organizations, institutional change, and external construction of internal organizational structure and occupational categories. Economic and organizational approaches are contrasted and applied to specific industries and sectors. The course will provide an overview of the current literature and a discussion of emerging research issues.]

SOC 540 Organizational Research
Fall. 4 credits.
T 2:30–4:25. D. Strang.
This seminar focuses on contemporary sociological research on organizations. It centers theoretically on the interplay of institutional, ecological,and economic accounts of social structure and social action. Broad subject matter includes organizational birth and mortality, the sources of organizational structure, interorganizational relationships, and stratification and mobility within organizations.

SOC 545 Peasants, Markets, and the State
Spring. 4 credits.
V. Nee.
This seminar makes the case for the agrarian origin of markets in early capitalist society and in the recent transition from state socialism. What is the historic role of the state and market in the transformation of peasant societies? To what extent does scholarship on peasants reflect more about the theoretical perspectives of the scholars who write about them than about peasant responses to the market and the state? This seminar reviews the debate between formalist and substantivists and outlines a new institutionalist paradigm in the study of peasants.

SOC 583 Transitions to Market Economies in Eastern Europe (also Management NRE 583)
Fall. 4 credits.
D. Stark.
This course examines the problems and prospects of transitions to markets in Eastern Europe. It introduces concepts for understanding the state socialist economy that is being transformed and analyzes important political developments since 1988. Topics include privatization, joint ventures, new capital markets, entrepreneurship, and labor relations in these changing economies.

SOC 591 Special Seminars in Sociology
Fall and spring. 2–4 credits.
Hours to be arranged. Staff.
These graduate seminars will be offered irregularly. Topics, credit, and instructors will vary from semester to semester. Students should look at the sociology department bulletin board at the beginning of each semester for possible offerings.

SOC 606–607 Sociology Colloquium
Fall and spring. No credit. Required of all graduate students. Juniors and seniors are encouraged to attend.
F 2:30–5. Staff.
A series of talks representative of current research interests in sociology, given by distinguished visitors and faculty members.

SOC 608 Proseminar in Sociology
Fall. One credit. Required of all first-semester graduate students.
Hour to be arranged. Staff.
Discussions on the current state of sociology and on the research interests of the members of the field, given by members of the field.

HDFS 655 Design of Research: A Practicum on Women's Career Choices
Fall. 3 credits.
P. Moen.

SOC 683 Social Interaction (also Psychology 683)
Spring. 4 credits.
D. P. Hayes.
Seminar: topic to be announced.

SOC 891–892 Graduate Research
891, fall; 892, spring. Up to 4 credits each term, to be arranged. Prerequisite: graduate status and permission of a faculty member willing to supervise the project.

SOC 895–896 Thesis Research
895, fall; 896, spring. Up to 6 credits each term, to be arranged. Prerequisite: permission of thesis director.

Summer Session

The following courses are frequently offered in the summer session, though not necessarily by the same instructor as during the academic year. Not all of these courses will be offered in a particular summer. Information regarding these courses and additional summer session offerings in sociology is available from the department.

SOC 101 Introduction to Sociology

SOC 103 Introduction to Sociology: Microsociology

SOC 243 Family

SOC 283 Groups and Relationships

SPANISH LANGUAGE

See Department of Modern Languages and Linguistics.

SPANISH LITERATURE

See Department of Romance Studies.

SWAHILI

See Africana Studies and Research Center.

SWEDISH

See Department of Modern Languages and Linguistics.

TAGALOG

See Department of Modern Languages and Linguistics.

TAMIL

See Department of Modern Languages and Linguistics.

THAI

See Department of Modern Languages and Linguistics.

THEATRE ARTS

Theatre, Film, and Dance

B. Levitt, Chairman; R. Archer, D. Bathrick, S. Brookhouse, J. Chu, J. Devenyi, D. Feldshuh, A. Fogelsanger, D. Fredericksen, J. E. Gainor, P. Gill, K. Goetz, K. Grant, P. Guion, D. Hall, M. Hays, J. Johnson, J. Morgenroth, C. Orr, M. Rivchin, J. Self, B. Suber, A. Van Dyke and R. Wilson

Through its courses and production laboratories, the department provides students with a wide range of opportunities in theatre, dance, and film. It offers a theatre arts major with concentration in theatre or film and a major in dance. These majors educate students in accordance with the general liberal arts ethic of the college. The programs in dance and film and the advanced undergraduate training program in theatre give some measure of professional preparation in those arts as well. The department encourages academic and studio participation by students from all disciplines and also provides the Cornell community with an opportunity to take part in its productions on an extracurricular basis.

Theatre Arts Major

Theatre Concentration

The theatre concentration offers studies in the history of theatre, dramatic theory and criticism, playwriting, acting, directing, design/technology, and stage management.

Course requirements for theatre concentration: **Credits**

1) **THETR 240** and **THETR 241** (two-semester introduction to theatre) 8

THETR 250 Introduction to Theatre Design and Technology 4

THETR 280 Introduction to Acting 3

2) Four laboratory courses distributed as follows: **Credits**

THETR 151 Production Lab I 1-3

THETR 153, THETR 253, or **THETR 353** Stage Management Lab I, II, or III 1-3

THETR 155 Rehearsal and Performance or **THETR 151** in a different area 1-3

THETR 251 or **THETR 351** Production Lab II or III 1-4

3) Four courses in the area of **Theatre Studies** (see Theatre Studies section of theatre courses) chosen in the following manner:

Two courses selected from THETR 331 through 399 8

Two courses selected from THETR 400 or above 8

4) Three courses (at least 9 credits) in other Theatre Arts courses chosen in consultation with the faculty advisor. Course taken to qualify for admission to the Advanced Undergraduate Training Program (described below) may also be used to fulfill this requirement.

5) Courses in which a student receives a grade below "C" cannot be used to fulfill the requirements for a Theatre Arts major.

The Advanced Undergraduate Training Program

The department offers advanced training in acting, directing, playwriting, design/technology, and stage management to students who qualify on the basis of outstanding achievement in coursework. Criteria for admission to the AUTP is by the completion of the appropriate "track" of courses and invitation of the faculty. The program provides students with intensive study in theatre as well as the opportunity to collaborate with professional faculty and guest artists. Department productions will be chosen to offer a unique experience to the individual student selected for the program. (For specific requirements please see listing of courses at end of department listings.)

Film

The study of film began in this department in the 1930s and continues to be based here. However, in the interim years it has also spread into a significant number of other departments in the college: Africana studies, anthropology, Asian studies, comparative literature, English, German studies, history, psychology, and romance studies. This proliferation of courses has been accompanied by a comparable proliferation of perspectives and faculty concerns, e.g., the relationship of national cinemas to national literatures and specific cultures, film's relationships to myth and ideology, the use of film as historical evidence, film's efficacy as a rhetorical medium, and film's contribution to perennial issues in aesthetics, the history of the arts, and studies in cognition.

This richness of courses and perspectives is matched by the ways in which students may make film the focus of their undergraduate studies. The four currently being used are as follows: 1) concentrating on film within a Theatre Arts major; 2) constructing an individually tailored Independent Major in film (including the possibility of placing film in tandem with another medium or discipline); 3) focusing on film as a College Scholar; and 4) concentrating in Visual Studies. Students interested in option 4 should consult Marilyn Rivchin (Theatre Arts) and/or Robert Ascher (Anthropology). Students interested in options 2 or 3 should consult Don Fredericksen (Theatre Arts) and Lynne Abel (director, College Scholar and Independent Major programs). Students interested in the first option should first consult Alison Van Dyke (director, Undergraduate Studies, Theatre Arts) and then one of the department's film faculty.

Film Concentration Requirements

The department's film concentration requires a total of 50 credits in film and related courses. Students should note that a number of film courses—including two required "core" courses: Theatre Arts 375 and 376—are offered on alternating years. This means that *students cannot fulfill the requirements for the major in less than two years*, and that they should plan accordingly, in consultation with their major advisor. Within the "core" required courses, Theatre Arts 274, Introduction to Film Analysis, should be taken during the sophomore year.

1. A core of *four* film courses:

THETR 274 Introduction to Film Analysis 4

THETR 375 History and Theory of Commercial Narrative Film (offered alternate years) 4

THETR 376 History and Theory of Documentary and Experimental Film (offered alternate years) 4

THETR 377 Fundamentals of 16mm Filmmaking 4

2. *One* of the following theatre courses:

THETR 250 Fundamentals of Theatre Design/Technology 4

THETR 280 Introduction to Acting 3

THETR 398 Directing I (prerequisite THETR 280) 4

3. *Four* courses (15–16 credits) in film offered by Theatre Arts as below, or by other departments (with consent of adviser):

THETR 290 Filming Other Cultures 3

THETR 313 The Japanese Film 4

THETR 378 Russian Film of 20s and French Film of 60s (offered alternate years) 4

THETR 379 International Documentary from 1945 to present (offered alternate years) 4

THETR 389 Luis Bunel and the Cinema of Poetry 4

THETR 396 German Film (offered alternate years) 4

THETR 413 Film and Performance 4

THETR 475 Seminar in the Cinema I (offered alternate years) 4

THETR 476 Seminar in the Cinema II (offered alternate years) 4

THETR 477 Intermediate Film Projects 4

THETR 494 Advanced Film Production (summer only) 4

THETR 653 Myth onto Film 4

4) 15 credits of related coursework inside or outside of Theatre Arts (approved by adviser). The courses chosen to fulfill this requirement should reinforce the student's particular interest in film. For example, a student interested in the psychology of film, or in ethnographic film, or in film vis-a-vis intellectual or social history, will be encouraged to choose "related course work" accordingly.

5) With a grade of less than C, a course cannot be used toward the concentration.

Film Study Abroad

The College of Arts and Sciences, through this department and in consort with a number of other colleges and universities, offers up to a full year's study at the Inter-University Center for Film and Critical Studies in Paris, France. The center's program is theoretical, critical, and historical. It is most useful to students pursuing a major in film studies and serves as an intensive supplement to their Cornell film courses. Fluency in French is required, and Theatre Arts 274, 375, and 376 are prerequisites. Inquiries should be addressed to Professor Fredericksen, Cornell's liaison with the center.

The Dance Program

The dance program offers courses in dance technique, improvisation, composition, performance, anatomical analysis of movement, and the history, theory, and criticism of dance. Technique courses include modern dance at four levels and ballet at three levels. Other dance forms, such as tap, historical dances, Japanese Noh, Indian, Javanese, and African dance are offered on a rotating basis. Courses in jazz and ballroom dance taken through the Physical Education program supplement these offerings. Technique classes develop strength, flexibility, coordination, and the ability to perceive and reproduce phrases of dance movement with clarity of rhythm, body design, and expression. The more advanced courses require the ability to perform complex phrases in various styles. Students may earn up to four academic credits (one each semester) in level III and IV technique only (see THETR 304, 305, 306, and 308). Students may also satisfy the physical education requirement by taking dance technique classes in the dance program. The schedule for all dance technique classes is available in the main office of the Center for Theatre Arts. Registration for technique classes takes place in Teagle Hall. Students

taking technique for academic credit must also register through their own colleges.

The faculty offer rehearsal and performance workshops in which they choreograph and rehearse original dances, performed in public concert. Admission to rehearsal and performance classes is by audition. Students may receive one academic credit (S-U grades only) when performing in student-faculty concerts by registering for THETR 155.

The Dance Major

To be admitted to the major, students must have completed two technique courses in modern dance or ballet at level II or above and THETR 210 (Beginning Dance Composition and Music Resources). It is also recommended that THETR 201 (Dance Improvisation) or THETR 233 or 305 (Explorations in Movement and Performance), THETR 250 (Fundamentals of Theatre Design and Technology), and Music 105 (Introduction to Music Theory) be taken before the junior year. The following requirements are expected of the majors.

Prerequisites for the major:

Two technique courses in modern dance or ballet at level II or above.

THETR 210 Beginning Dance Composition and Music Resources

Requirements for the major:	**Credits**
Music 105 Introduction to Music Theory (or substitute at the appropriate level)	3
One course in historical dance, tap, jazz, a non-western form, folk dance, ballroom dance	0–3
THETR 201 Dance Improvisation	3
THETR 250 Fundamentals of Design and Technology	4
THETR 314–315 Western Dance History	8
THETR 418 or other 400-level academic dance course	4
THETR 155 Rehearsal and Performance	1
Two semesters each of ballet and modern dance and one explorations (in addition to the prerequisite)	0–5
THETR 310–311 Intermediate Projects in Dance Composition	6
THETR 312 Physical Analysis of Movement	3
THETR 410–411 Advanced Dance Composition	6

Students will be expected to perform in at least two concerts and to present at least two of their own dances, in addition to the senior project.

Additional credits, for a total of 45, should be selected in consultation with the advisor. Of the 45 credits, at least 32 must be at the 300 level or higher.

Department Courses

Freshman Writing Seminars

THETR 108 Writing about Film
Summer. 3 credits.
Staff.

[THETR 110 Topics in the Cinema
Spring. 3 credits. Not offered 1992–93.
Staff.]

[THETR 120 The Unfashionable Human Body
Spring. 3 credits. Not offered 1992–93.
J. Johnson.
At an early age we learn the major power of dress. There are many theories about why we wear clothes: protection from the elements, love of ornamentation, sexual attraction, and modesty, to name a few. Whatever the reason(s), our dissatisfaction with the human body expresses itself in all cultures, and that expression is endlessly changing. Students will explore the various theories, look at examples from decoration to distortion (i.e., masks, corsets, tattoos, and fads) and write about how society addresses (or undresses) "the unfashionable human body."]

[THETR 130 American Myth in Drama
Fall. Not offered 1992–93.
Staff.]

THETR 140 From Script to Stage: Banned in the U.S.A.!
Fall and spring. 3 credits.
T R 11:40–12:55. S. Keller.
According to the First Amendment of the Constitution, all citizens are guaranteed the right to free speech. Since 1789, when the First Amendment was added to the Constitution, however, artists of every discipline, particularly theatre practitioners, have been censored based on charges ranging from obscenity to the disruption of law and order. What makes theatre the most "dangerous" art? How can censorship exist in a free and democratic nation where censorship is seemingly unconstitutional? Students will explore these and other questions in their essays through the reading of dramatic, historical, and philosophic writings. Texts will include the works of Plato, Marx, The Living Theatre, Stephen Sondheim, 2 Live Crew, and Theatre Cornell Productions.

THETR 160 Writing in the Theatre: Performance as Text
Fall and spring. 3 credits.
T R 1:25–2:40. A. Ellis.
"To write for the ear alone." Yeats described his mission as a playwright just so, highlighting the central paradox of writing in the theatre. The division between the oral and written language is nowhere more apparent than on the stage. In this course, students will explore that division, its manifestations and its ramifications, as we approach the problem of writing about a performative event as it occurs on stage and as it is recorded on the page. We will read and view several radically oral plays, and will discuss in depth the differences between spoken and written language, and between writing for reading and writing for performances by Roadside Theatre, Junebug Theatre, El Teatro de la Esperanza, and others.

THETR 170 Writing About the Theatre
Fall. 3 credits.
T R 10:10–11:25. J. E. Gainor.
Writing about the theatre entails much more than composing the scathing reviews for which drama critics are notorius. We will consider the theatre from many angles: its place in cultural history, literary elements of dramatic texts, the theatrical production and its components. Focusing on the three main productions in the Theatre Arts Department during the semester, we will explore numerous perspectives on performance, and by seeing the dramas and meeting with artistic personnel, we will develop a fuller understanding of the multiple positions from which we can critique and discuss the theatrical event.

THETR 180 Introduction to Asian Theatre
Fall and spring. 3 credits.
MW F 9:05–9:55. L. Lessard.
Course readings will entail a tour of ancient and modern texts and scripts from India, China, and Japan. The spectacular histories of various Asian countries and the religious and political stories which are the foundation of Asian theatre will be surveyed. The course will include viewing of numerous video tapes illustrating the dances, music, martial arts, and techniques and conventions of the theatrical forms studied. In-class discussions and journal writing will be key elements of the course. Students will be encouraged, through their writings, to examine their personal responses to Asian theatre. A wide-ranging exploration of contrasts and comparisons between various forms of Asian and world theatre will also be encouraged. Students will be given the opportunity to present their written work for group discussions that will be aimed at facilitating the re-writing process.

THETR 190 Theater and Society: Theater—Who Needs It?
Fall and spring. 3 credits.
M W F 1:25–2:15. E. Groves.
In this course we will examine various ways in which the positive and/or negative value of a theater to its society has been asserted. We will investigate several ideas about how or whether a society creates, modifies, and/or is modified by its theater, focusing on the social-historical contexts and ideological value judgments such ideas represent and reveal.

Theatre Studies Courses

[THETR 223 The Comic Theatre (also Comparative Literature 223 and Classics 223) #
Spring. 3 credits. Not offered 1992–93. Next offered 1993–94.
J. Rusten.
See Classics 223 for course description.]

THETR 240 Introduction to Western Theatre I #
Fall. 4 credits.
T R 10:10–11:25. J. Devenyi.
A survey of the major developments in the theatre—playwriting, acting, staging, architecture, and dramaturgy—in classical Greece and Rome, medieval and Renaissance Europe. Representative plays will be read and discussed in their theatrical context.

THETR 241 Introduction to Western Theatre II #
Spring. 4 credits.
T R 10:10–11:25. J. Devenyi.
A survey of the major developments in the theatre—playwriting, acting, staging, architecture, and dramaturgy—since 1642. Among the areas considered will be French Neoclassicism, the English Restoration, the eighteenth and nineteenth centuries in England, France, and Germany and the modern international stage. Representative plays will be read and discussed in their theatrical context.

THETR 322 Russian Drama and Theatre (also Theatre Arts 622 and Russian 332/632)
Fall. 4 credits.
See Russian 332 for description.

[THETR 325 Classic and Renaissance Drama (also Comparative Literature 352) #
Spring. 4 credits. Not offered 1992–93.
Staff.
A study of the major traditions in Western drama from the beginnings among the Greeks to the Renaissance in England and Spain. The work will consist of both lectures and discussions, focusing primarily on a close reading of the plays. But we shall also give attention to the physical conditions of production and to social and political contexts. Among the authors to be read will be Aeschylus, Sophocles, Euripides, Aristophanes, Marlowe, Shakespeare, and Lope de Vega.]

[THETR 326 European Drama, 1660 to 1900 (also Comparative Literature 353) #
Spring. 4 credits. Not offered 1992–93.
Staff.
Readings from major dramatists from Corneille to Chekhov, including such authors as Moliere, Congreve, Marivaux, Goldoni, Gozzi, Schiller, Kieist, Gogol, Ostrovski, and Ibsen.]

[THETR 327 Modern Drama (also Comparative Literature 354)
Spring. 4 credits. Not offered 1992–93.
Readings in European drama from Ibsen to the present.]

THETR 331 The Classical Theatre #
Fall. 4 credits. Prerequisite: Theatre Arts 240 or permission of instructor.
T R 2:55–4:10. J. Devenyi.
An examination of major developments in the theatre—acting, staging, dramaturgy—and the historical background to these developments in Greek and Roman society. Representative plays will be read and discussed in their theatrical text.

[THETR 332 Medieval and Renaissance Drama (also English 328) #
Fall. 4 credits. Prerequisites: 240 or permission of instructor. Not offered 1992–93.
Staff.]

THETR 333 From the Neo-classical Theatre to the Well-Made Play #
Spring. 4 credits. Prerequisite: Theatre Arts 240 or 241.
T R 12:20–2:15. J. Devenyi.
A study of theatrical styles and production modes. Topics include the English Restoration and French Neoclassical theatres, the European court theatre, romanticism in the theatre, and the rise of standing commercial theatre companies. Representative plays will be read and discussed in their theatrical context.

[THETR 335 The Modern and Contemporary Theatre
Fall. 4 credits. Prerequisites: Theatre Arts 240 or permission of instructor. Not offered 1992–93.
A study of theatrical styles and production modes. Examination of advances in acting, directing, design, and dramaturgy in theory and in practice from the late nineteenth century through the present day. Representative plays will be read and discussed in their theatrical context.]

THETR 336 American Drama and Theatre (also English 336)
Spring. 4 credits. Limited to 20 students. Prerequisite: permission of instructor.
T R 1:25–2:40. J. E. Gainor.
A survey of twentieth-century American theatre and representative American plays.

THETR 400 Modern Performance Problems
Fall. 4 credits. Prerequisites: TA 240, 280, and 281 and permission. Limited to 14 students.
T R 12:20–2:15. E. Gainor and R. Wilson.
This class is a combination of play analysis and performance focused on the special problems of gender issues in modern dramatic material. Playwrights to be studied are Caryl Churchill, Sam Shepard, and Marsha Norman. The class will not only deal with some of the plays by these authors, but also critical writings based on their work. Requirements will include the performance of monologues and scenes and the writing of three papers.

THETR 431 Theory of the Theatre and Drama (also Comparative Literature 433) #
Fall. 4 credits. Prerequisite: some theatre history and dramatic literature work at the 300 level or permission of instructor.
T 10:10–12:35. M. Hays.
A survey of dramatic theory and theories of theatrical representation from Aristotle to the present.

THETR 433 Dramaturgy: Play and Period (also Women's Studies 433)
Spring. 4 credits.
T 10:10–12:35. J. E. Gainor.
Is there a "female dramaturgy"? What is the female tradition in the theatre? The course will explore these questions through an investigation of texts by women dramatists, including Hrotsvitha, Aphra Behn, and Caryl Churchill, as well as theory by such critics as Sue Ellen Case and Jill Dolan.

THETR 434 Theatre and Society (also Comparative Literature 434)
Spring. 4 credits. Prerequisite: permission of instructor or some work in theatre history or dramatic literature at the 300 level.
R 10:10–12:35. M. Hays.
Historical Drama: History in the theatre, the theatre in history.

[THETR 435 Special Topics
Visiting faculty. Not offered 1992–93.]

[THETR 438 East and West German Drama
Fall. 4 credits. Not offered 1992–93.
D. Bathrick.
This course will cover the major historical and textual developments in German theatre from the end of World War II to the present. Leading dramatists from West and East Germany, Switzerland, and Austria (Brecht, Frisch, Durrenmatt, Weiiss, Hochhuth, Muller, Braun, Kroetz, Handke, and others) will be treated in the light of the political events and aesthetic-dramaturgical traditions from which they emerge and with which they are taking issue.]

THETR 440 Issues in Community-Based Arts
Spring. 4 credits. Limited to 25 students. Permission of instructor.
M 4–6, hours in the field to be arranged.
B. Levitt, J. Salmons-Rue, R. Short.
The course combines participation in a campus or community project and a weekly seminar that will survey theories and practices in community-based arts. Community-based art forms in general, and storytelling in particular, will be explored. The process of program planning and implementation, as well as the context (cultural, demographic, organizational) will be examined in relationship to field experiences. Artists from Junebug Theater and Roadside Theater Companies will participate in seminar discussions and collaborate with students on the projects.

[THETR 471 Japanese Theatre (also Asian Studies 471) @ #
Fall. 4 credits. Not offered 1992–93.
K. Brazell.
See Asian Studies 471 for course description.]

THETR 622 Russian Drama and Theatre (also Theatre Arts 322 and Russian 332/632)
See Russian 322 for description.

THETR 633 Seminar in Theatre History (also English 628 and Comparative Literature 631)
Fall. 4 credits.
Fall. T 2:30–4:25. M. Hays.
Regarding the drama in nineteenth-century France, Germany, and England: Stages of historical change.

THETR 636 Seminar in Dramatic Criticism (also Comparative Literature 636)
Spring. 4 credits. Prerequisite: Permission of instructor.
R 2:30–4:25. M. Hays.
From Lukàcs to Lyotard: Critical responses to the modern stage and its drama.

[THETR 637 Seminar in Dramatic Theory
Spring. 4 credits. Prerequisite: Permission of instructor. Not offered 1992–93.
M. Hays.]

[THETR 648 East and West German Drama: Post-1945 (also German Studies 438)
Fall. 3 credits. Not offered 1992–93.
D. Bathrick.
This course will cover the major historical and textual developments in German theatre from the end of World War II to the present. Leading dramatists from West and East Germany, Switzerland, and Austria (Brecht, Frisch, Durrenmatt, Weiiss, Hochhuth, Muller, Braun, Kroetz, Handke, and others) will be treated in the light of the political events and aesthetic-dramaturgical traditions from which they emerge and with which they are taking issue.]

[THETR 656 Race and Theatre in America (also English 656)
Spring. 4 credits. Not offered 1992–93.
B. Jeyifo.
See English 656 for course description.]

[THETR 660 Visual Ideology (also Comparative Literature 660)
Spring. 4 credits. Not offered 1992–93.
G. Waite.
See Comparative Literature 660 for description.]

[THETR 678 Theory and Practice of Modern Drama
Spring. 4 credits. Not offered 1992–93.
D. Bathrick.
The course will explore different theories of modern drama (Szondi, Brecht, Artaud, etc.) and discuss these on the basis of a number of representative works of modern drama. The point will be to trace the interchange between theory formation and dramatic practice.]

THETR 679 Bertolt Brecht in Context (also German Studies 679 and Comparative Literature 679)
Spring. 4 credits. Requirements: seminar paper that will form the basis for an oral presentation for class discussion.
W 2:30–4:25. D. Bathrick.
Brecht's theory and dramatic praxis will be examined in the light of a two-fold contexts: (1) the relation of selected plays and writings to the historical contingencies of the Weimar and exile periods in which they emerged; (2) in later periods: an analysis of the reception and various readings (postmodern, feminism, post-structuralism) of these same works by later writers and critical publics in Germany and the United States as a way of understanding the changing nature of aesthetic values in the postwar period. Special attention will be given to the importance of Marxism for Brecht's art, as well as to the author's role as a representative of the cultural avant-garde.

THETR 692 The Politics of Criticism (also Comparative Literature 692 and German Studies 692)
Fall. 4 credits.
M 2:30–4:25. D. Bathrick.
See German Studies for description.

Acting

THETR 155 Rehearsal and Performance
Fall or spring. 1–2 credits. 1 credit per production experience per term up to 2 credits per term. Students must register for the course in the term in which credit is earned; requests for retroactive credit will not be honored. Limited to students who are assigned roles after tryouts at the department's scheduled auditions. Students should add this course only after they have been assigned roles. S-U grades only.
Staff.
The study, development, and performance of roles in departmental theatre or dance productions or the study and practice of directing as experienced in assisting faculty and guest directors.

THETR 205 Rehearsal Workshop
Fall or spring. 2 credits. Limited to 30 students. Prerequisites: participation in a particular department production; and by permission.
2–4 hours per week, TBA. D. Feldshuh.
This course will enable students participating in a particular production to gain expertise and/or knowledge to contribute to that production. The focus of the class will depend on the needs of a particular production (history, choreography, textwork, dramaturgy, etc). This class will leverage the experience of participating in a production by allowing students to focus intensely on a particular aspect of that production in a non-pressurized learning environment.

THETR 280 Introduction to Acting
Fall or spring. 3 credits. Each section is limited to 16 students. Registration only through roster in the department office, Center for Theatre Arts.
01 T R 2:30–4:25 (primarily for prospective majors and those interested in extended study of acting), A. Van Dyke. 02 T R 12:20–2:15, staff. 03 M W 12:20–2:15, staff. 04 M W 2:30–4:25, staff. 05 T R 2:30–4:25, staff. 06 T R 10:10–12:05, staff. 07 M W 2:30–4:25, staff.
An introduction to the actor's technique and performance skills, exploring the elements necessary to begin training as an actor, i.e., observation, concentration, and imagination. Focus will be on physical and vocal exercises, improvisation, and text and character. There is required play reading, play attendance, and some scene study.

THETR 281 Acting I
Fall or spring. 3 credits. Each section limited to 14 students. Prerequisites: Theatre Arts 280 and audition. Registration only through roster in department office, the Center for Theatre Arts. 281 is restricted to sophmores and above.
01 T R 10:10–12:05, A. Van Dyke. 02 M W 12:20–2:15, staff.
Practical exploration of the actor's craft through improvisation and exercises in physical and psychological action. Scene study utilizing the plays of Williams, Inge, and Miller.

[THETR 282 Introduction to Voice and Speech for Performance
Fall or spring. 2 credits. Not offered 1992–93.
Staff.
Study and practice in the development of the speaking voice with emphasis on tone quality, breathing, articulation, and practice of standard American English pronunciation. Some oral interpretation of poetic, narrative, and dramatic text.]

[THETR 283 Voice and Speech for Performance
Spring. 2 credits. Limited to 12 students. Primarily for department majors. Prerequisites: TA 282. Not offered 1992–93.
Registration only through department roster in the main office of the Center for Theatre Arts. Development of the speaking voice with additional emphasis on dramatic interpretation.]

[THETR 284 Speech and Dialects for Performance
Spring. 3 credits. Limited to 12 students. Primarily for department majors or advance undergraduate training program candidates. Prerequisites: TA 280, 281, and permission of instructor. Registration only through department roster in the main office of the Center for Theatre Arts. Not offered 1992–93.
A. Van Dyke.
Development of speech and dialects in dramatic text.]

THETR 285 Creativity and the Actor
Summer. 3 credits. Limited to 16 students.
M–F. 9–11:30. D. Feldshuh.
Using mime, physical and vocal exercises, karate, Gestalt therapy, theatre games, and Zen meditation, this course will attempt to make the student more aware of how he or she participates in and can influence the creative process of acting and to assist the student toward a greater capacity for stage presence. The course will deal with hindrances to the creative response (stage fright, self-consciousness, mannerisms, physical and vocal tension, emotional blocks), introduce the concepts of energy, stillness, and release, and explore the relationship between emotion, mind, and body structure. It will attempt to give the individual tools with which the student may continue to expand his or her capacity for spontaneous, flexible, and believable acting.

THETR 287 Summer Acting Workshop
Summer. 3 credits. Limited to 16 students in a section.
An introduction to the processes of acting. Practice in training techniques, rehearsal procedures, and methodology.

THETR 380 Acting II
Fall. 3 credits. Prerequisite: TA 281 and audition. Limited to 12 students.
T R 10:10–12:05. R. Wilson.
A continuation of Acting I. Special consideration will be given to a physical approach to characterization utilizing the plays of Chekhov and Ibsen.

THETR 381 Acting III: Advanced Scene Study
Spring. 3 credits. Prerequisite: TA 280, 281, 380, and audition. Limited to 10 students.
T R 10:10–12:05. A. Van Dyke.
This course focuses on advanced problems in language and period style (movement, bows, and curtsies). Monologues and scenes will be drawn from these playwrights: Shakespeare, Moliere, Shaw/Coward, Sheridan/Goldsmith/Wycherly, and Aeschylus/Euripedes.

THETR 385 Skills, Techniques, and Approaches to Performance
Spring. 3 credits. Prerequisites: Theatre Arts 281 or permission of instructor. Limited to 10 students.
M W 2:30–4:25. K. Grant.
Preparation, performance and critique of scenes form the repertoire of post-1960 musical theatre pieces. This course will also explore basic musical theatre dance styles, e.g., tap and jazz.

Directing

THETR 155 Rehearsal and Performance
Fall or spring. 1–2 credits. 1 credit per production experience per term up to 2 credits per term. Students must register for the course in the term in which credit is earned; requests for retroactive credit will not be honored. Limited to students who are assigned assistant director positions after obtaining director's approval. Students should add this course only after they have been given approval. S-U grades only.
Staff.
The study, development, and performance of roles in departmental theatre or dance productions or the study and practice of directing as experienced in assisting faculty and guest directors.

THETR 398 Fundamentals of Directing I
Fall. 3 credits. Limited to 10 students. Prerequisite: Theatre Arts 280 and permission of instructor.
M W 12:20–2:15, plus lab hours W or R 9:30. D. Feldshuh.
Focused, practical exercises to teach the student the fundamental staging techniques that bring a written text to theatrical life. A core objective of the course is to increase the student's awareness of why and how certain stage events communicate effectively to an audience. Each student will direct a number of exercises as well as a short scene.

THETR 498 Fundamentals of Directing II
Spring. 4 credits. Enrollment strictly limited. Prerequisite: Theatre Arts 280 and 398, and permission of instructor. Recommended: Theatre Arts 250 and 281.
M W 12:20–2:15 plus lab time to be arranged. D. Feldshuh.
The course builds on the staging techniques learned in Fundamentals of Directing I. In this course each student will direct a series of

projects and public presentations focusing on specific directoral challenges. The student will develop an increased ability to articulate and defend directoral choices and learn to work with actors on a diverse range of material.Directors will cast from a company of actors to be auditioned early in the semester. Each actor in the company will earn one or two credits as part of Theatre Arts 155.02.

THETR 499 Seminar in Directing
Fall or spring. 1–4 credits. Prerequisites: Theatre Arts 240, 250, 280, 398, 498, and permission of instructor.
Hours to be arranged. D. Feldshuh.
This seminar will give the student the opportunity to direct a full evening of theatre. It may also involve an internship with a prominent director on campus and a final paper focusing on a specific aspect of directing.

Playwriting

[THETR 348 Playwriting
Spring. 4 credits. Prerequisite: permission of instructor. Not offered 1992–93.
R. Wilson.
A laboratory for the discussion of student plays. Following exercises in dramatic structure and technique, students will be expected to write two or three one-act plays.]

[THETR 349 Advanced Playwriting
Spring. 4 credits. Prerequisite: Theatre Arts 348. Not offered 1992–93.
R. Wilson.
A continuation of Theatre Arts 348, culminating in the composition of a full-length play.]

[THETR 497 Seminar in Playwriting
Fall. 1–4 credits. Prerequisite: Theatre Arts 348 and 349 or permission of instructor. Not offered 1992–93.]

Design, Technology and Stage Management

Design

THETR 250 Fundamentals of Theatre Design and Technology
Fall and spring. 4 credits. Not open to first term freshman. Limited to 12 students. A minimum of one credit of Production Lab (TA 151 or 251) is strongly recommended concurrently.
M W F 12:20–2:15. R. Archer, J. Johnson, P. Gill, K. Goetz, D. Hall, C. Orr.
An introduction to design and technology in the theatre. Lectures, discussion, and project work introduce the principles of designing scenery, costumes, lighting and sound, and the technical process of realizing designs on stage. Students are required to purchase materials, which the instructors will specify (approximate cost, $35).

THETR 258 Millinery Workshop
Summer. 2 credits. Limited to 10 students.
M W 2:00–4:00. C. Orr.
A workshop oriented class intended to teach the students millinery construction. We will briefly examine the historical significance of headwear and construction techniques. Three projects will be completed: a covered Buckram frame, a shaped felt, and a straw (woven or braided). Lab fee per students of approximately $75 to be paid in class. Students will keep their finished projects.

[THETR 343 Costume History: From Fig Leaf to Vanity
Fall. 3 credits. Limited to 20 students. Not offered 1992–93.
T R 2:55–4:10. C. Orr.
Costume History will offer an overview of the history of clothing from the first signs of clothing to the early 20th century. It will investigate personal, social, religious, political, and regional reasons for why and how clothing evolved.]

[THETR 358 Draping Studio
Spring. 3 credits. Prerequisites: TA 356 or permission. Limited to 10 students. Not offered 1992–93.
J. Johnson.
This course provided further experiences in the area of costume construction, particularly in the specialized area of patterning. Students will learn to make patterns by the method of draping on the form and will conclude the class by building a complete costume (from inside out) using that method of patterning.]

THETR 360 Costume Crafts Studio
Spring. 3 credits. Limited to 10 students.
M W 10:10–12:05. J. Johnson.
This course will provide hands-on experiences for students in the form of a series of workshops conducted by faculty members, visiting artists (from the community, primarily), and class members themselves. Workshops may include mask-making, fabric manipulation, hair and wig care and construction, and millinery. Students will conclude the course by creating a costume utilizing three different techniques from the workshops and/or one discovered through individual research.

THETR 362 Lighting Design Studio I
Fall. 4 credits. Students are required to purchase materials which the instructor will specify (approximate cost $50.00). Prerequisite: TA 252 and 340 or permission of instructor. Limited to 6 students.
M W 10:10–12:05. P. Gill.
An examination of the basic theories of color and the physical characteristics of light through discussion and facsimile design projects. This course concentrates on the individual development of the lighting designer as a versatile artist. Discussion and guest artist lectures are combined with individual tutorial sessions and various environmental lighting design competition entries tailored to each student. This structure provides students with an opportunity to originate an independent, contemporary style of lighting design.

THETR 364 Scenic Design Studio
Fall and spring. 3 credits. Students are required to purchase materials which the instructor will specify (approximate cost: $50.00). Limited to 10 students. Prerequisite: TA 250 and 340 or permission of instructor.
M W 10:10–12:05. K. Goetz.
An exploration of the process of designing scenery for the live theatre. Emphasis on the analysis of the dramatic text, research, and the use of imagery to support dramatic intent of playwright. Class projects will engage students in using a variety of mediums to explore how architecture, the arrangement of space, and elements of interior design are used dramatically. Class activities and projects are designed to encourage the development of student's innate expressive abilities. Experience in theatre production and graphic skills is helpful but not essential. May be repeated for credit.

THETR 366 Costume Design Studio
Spring. 3 credits. Students are required to purchase materials which the instructor will specify (approximate cost: $50.00). Prerequisite: Permission of instructor. Limited to 10 students.
T R 10:10–12:05. J. Johnson.
Design of costumes for the theatre, concentrating on script and character analysis, period research, design elements, figure drawing and rendering skills, and understanding production style. May be repeated for credit.

THETR 368 Sound Design Studio
Spring. 4 credits. Limited enrollment to 6 students. Prerequisite: TA 252 and TA 250 or permission of instructor. Students are required to purchase supplies (approximate cost $30.00).
T R 12:20–2:15. C. Hatcher.
The use of sound as a medium of design for the theatre; research and creation of sound score, recording and engineering techniques, live effects and projects in live and studio sound production.

THETR 441 Theatrical Design and Technology for Non-Traditional Spaces
Spring. 4 credits. Limited to 12 students.
TBA. P. Gill, staff, and B. Mays (of Roadside Theatre Company).
Lectures, discussion, and project work introduce the visual principles of designing scenery, costumes, lighting, and sound for touring theatre and non-traditional theatrical forms. This course will also familiarize students with the technical process of realizing designs for touring productions. Students will complete the course by performing as company technicians for a live tour.

THETR 462 Lighting Design Studio II
Spring. 4 credits. Prerequisite: TA 362 or permission of instructor. Limited to 6 students.
M W 10:10–12:05. P. Gill.
This course concentrates on the individual development of the lighting designer as a versatile artist. Discussion and guest artist lectures are combined with individual tutorial sessions and various environmental lighting design competition entries tailored to each student. This structure provides students with an opportunity to originate an independent contemporary style of lighting design.

Technology

THETR 252 Technical Production Studio I
Fall. 3 credits. Limited to 6 students.
T R 2:30–4:25. C. Hatcher, A. Steinbock.
Stage Lighting and Sound Technology: The practical aspects of lighting technology and sound including equipment setup, engineering, electrics, organization, recording techniques, and production paperwork will be explored through projects, lectures, and class discussions. In addition to twice-weekly class meetings the course requires a laboratory commitment of fifty hours for the semester.

THETR 254 Theatrical Make-up Studio
Fall. 3 credits. Students are required to purchase make-up kits which the instructor will provide (approximate cost $40.00). Prerequisite: permission of instructor.
T R 2:30–4:25. J. Johnson.
Basic techniques of make-up for the stage including corrective, old age, and fantasy; use of prosthetics, wigs, hair and hairpieces.

THETR 256 Technical Production Studio II
Spring. 3 credits. Limited to 6 students. Students are required to purchase materials which the instructor will specify (approximate cost $25.00). Prerequisite: TA 250 or permission of instructor.
T R 2:30–4:25. N. Cross, K. Krump.
Scene Painting: Techniques of paint and set decoration for the stage including large format layout, grid systems, transfer methods, color mixing and matching, dye painting, airbrush and spray systems are a traditional approach to scenic art. Stage Properties: The design and construction of scenic, hand and costume props, concentrating on period research and accuracy of detail, use of various materials, crafts and construction techniques, and painting and finishing.

THETR 340 Theatrical Drafting and Technical Drawing Studio
Fall. 3 credits. Limited to 6 students. Prerequisite: Theatre Arts 250 or permission of instructor.
M W F 9:05–9:55. S. Brookhouse.
Implementation of the fundamentals of drafting and technical drawing. Introduction of the concept of an individual style in the approach to drafting for the theatre. A series of projects to familiarize students with the convention and process of visualization and drafting.

THETR 354 Stagecraft Studio
Fall. 3 credits. A minimum of one credit of production laboratory (TA 151 or 251) is strongly recommended concurrently. Prerequisite: TA 250 or permission of instructor.
T R 10:10–12:05. R. Archer.
An exploration of the techniques and practice of theatre operation, scenic construction, stage mechanics, rigging, painting, and model building.

THETR 356 Costume Construction Studio
Fall and spring. 3 credits. A minimum of one credit of production laboratory (TA 151 or 251) is strongly recommended concurrently. Prerequisite: TA 250 or permission of instructor. Lab fee of $10 to be paid in class.
M W 2:30–4:25. C. Orr.
A project/lecture/discussion class in costume research, patterning, cutting, construction, and fitting.

Stage Management

THETR 153 Stage Management Production Laboratory I
Fall and spring. 1–3 credits. May be repeated for credit. Before registering, students must attend orientation meeting in the Proscenium theatre at the Center for Theatre Arts at 7:30 p.m. on the first Tuesday of classes. Prerequisite: permission of instructor.
P. Guion.
Practical production experience in theatrical production as an assistant stage manager for a smaller scale production under the supervision of the faculty production stage manager. Theatre Arts 370 complements this course.

THETR 253 Stage Management Laboratory II
Fall and spring. 1–3 credits. May be repeated for credit. Before registering, students must attend orientation meeting in the Proscenium theatre at the Center for Theatre Arts at 7:30 p.m. on the first Tuesday of classes. Prerequisite: permission of instructor.
P. Guion.
Practical experience in theatrical production as assistant stage manager for a large scale production under the supervision of the faculty production stage manager. TA 370 complements this course.

THETR 353 Stage Management Laboratory III
Fall and spring. 1–3 credits. May be repeated for credit. Before registering, students must attend orientation meeting in the Proscenium theatre at the Center for Theatre Arts at 7:30 p.m. on the first Tuesday of classes. Prerequisite: permission of the instructor.
P. Guion.
Practical experience in theatrical production as stage manager for a small scale production under the supervision of the faculty production stage manager. TA 370 complements this course.

THETR 370 Stage Management Studio
Fall and spring. 1 credit. Prerequisite: TA 250 or 280. T 2:30–4:25
P. Guion.
Introduction to the concepts and techniques of stage management as they relate to specific areas of production. Development of relevant communication skills and an understanding of the production process as experienced by a working stage manager or assistant stage manager. TA 153, 253, and 353 complement this course.

THETR 453 Stage Management Laboratory IV
Fall and spring. 1–3 credits. May be repeated for credit. Before registering, students must attend orientation meeting in the Proscenium theatre at the Center for Theatre Arts at 7:30 p.m. on the first Tuesday of classes. Prerequisite: permission of instructor.
P. Guion.
Practical experience in theatrical production as stage manager for a large-scale production under the supervision of the faculty production stage manager.

Production Laboratories

THETR 151 Production Laboratory I
Fall and spring. 1–3 credits. May be repeated for credit. Orientation meeting on the first Tuesday of classes each semester at 7:30 p.m. in the CTA lobby.
S. Brookhouse, N. Cross, D. Hall, C. Hatcher, K. Krump, C. Orr.
Students register for sections by areas of interest. 01 Scenery, 02 Costumes, 03 Properties, 04 Lighting, 05 Sound. No prerequisites or experience required. This course provides practical experiences in theatrical production, as a member of the production crew.

THETR 251 Production Laboratory II
Fall and spring. 1–3 credits.
S. Brookhouse, N. Cross, D. Hall, C. Hatcher, K. Krump, C. Orr.
Practical experience in theatrical production, in more advanced positions of responsibility on the production crew. Prerequisite: TA 151 or permission of instructor. May be repeated for credit. Orientation meeting on the first Tuesday of classes each semester at 7:30 p.m. in the CTA lobby. Students register for sections by areas of interest: 01 Scenery, 02 Costumes, 03 Properties, 04 Lighting, 05 Sound.

THETR 351 Production Laboratory III
Fall and spring. 1–3 credits. May be repeated for credit. Orientation meeting on the first Tuesday of classes each semester at 7:30 p.m. in the CTA lobby. Prerequisite: Permission of instructor.
R. Archer, C. Hatcher, P. Gill, K. Goetz, C. Orr.
Students register for sections by areas of interest: 01 Scenery, 02 Costumes, 03 Properties, 04 Lighting, 05 Sound. This course provides practical experience by placing the student in a position of major responsibility either with the Cornell Theatre Arts production staff or as an assistant to a faculty or guest designer.

THETR 451 Production Laboratory IV
Fall and spring. 1–4 credits. May be repeated for credit. Students register for sections by areas of interest: 01 Scenery, 02 Costumes, 03 Properties, 04 Lighting, 05 Sound. Prerequisite: admission of AUTP.
R. Archer, P. Gill, K. Goetz, C. Hatcher, J. Johnson.
Practical experience in theatrical production, in the position of designer or in another position of major responsibility on the production staff. This course is required to participate in and receive credit for Advanced Undergraduate Theatre Program design or production assignments.

Independent Study, Internships and Honors

THETR 300 Independent Study
Summer, fall, or spring. 1–4 credits.
TBA. Staff.
Independent Study in the Theatre allows students the opportunity to pursue special interests not treated in regularly scheduled courses. A faculty member, who becomes the student's instructor for the course, must approve the student's program of study and agree to provide continuing supervision of the work. Students must prepare a proposal for independent study.

THETR 485 Undergraduate Internship
Fall, spring, or summer. 1–6 credits.
TBA. Staff.
To be eligible to enroll and receive credit for an internship, Theatre Arts students must either be majors or be admitted to the Advanced Undergraduate Theatre Program (AUTP). Students are responsible for arranging their own internships in consultation with the AUTP faculty in their area of choice prior to preregistration of the semester in which the internship is planned to take place. To receive credit for this course, it must be an unpaid internship; if it is a paid internship, it is possible to receive independent study (see TA 300) credit for it.

THETR 495 Honors Research Tutorial
Fall or spring. 2–8 credits. Limited to Theatre seniors only.
TBA. Staff.
This course is the first of a two-semester sequence (the second is TA 496). Up to eight credit hours and one grade will be given upon completion of second semester. The Theatre Arts honors program is for majors who have demonstrated exceptional ability in the major and who seek an opportunity to explore branches of their subject not represented in the regular curriculum or to gain experience in original research. To be a part of the honors program the student must maintain an average of A- in departmental courses and an

average of B in all courses. Students should consult with their advisers in their junior year if deciding to do honors.

THETR 496 Honors Thesis Project
Fall or spring. 2–8 credits. Limited to Theatre seniors only.
TBA. Staff.
This course is the second of a two-semester sequence (the first is TA 495). Up to eight credit hours and one grade will be given upon completion of second semester. See Theatre Arts 495 for further information.

FILM

THETR 274 Introduction to Film Analysis: Meaning and Value
Fall. 4 credits. Limited to thirty-five students.
T R 10:10–12:35. D. Fredericksen.
An intensive consideration of the ways films generate meaning and of the ways we attribute meaning and value to films. Discussion ranges over commercial narrative, documentary, and personal film modes. Prospective film majors should enroll in their sophomore year.

THETR 290 Filming Other Cultures (also Anthropology 290)
Spring. 3 credits. Limited to 20 students, with preference given to those who have taken either Anthropology 102 or Theatre Arts 274.
T R 8:40–9:55. R. Ascher.
See Anthropology 290 for course description.

THETR 313 The Japanese Film (also Asian Studies 313) @
Spring. 4 credits.
Screenings, M W 7:30; lec, T R 1:25–2:40.
B. de Bary.
See Asian Studies 313 for course description.

[THETR 330 Political Theory and Cinema (also German Studies 330 and Government)
Fall. 4 credits. Not offered 1992–93.
G. Waite.
See German Studies 330 for a course description.]

THETR 375 History and Theory of the Commercial Narrative Film
Fall. 4 credits. Fee for screening expenses, $10 (paid in class).
T R 1:25–4:25. D. Fredericksen.
Consideration of the broad patterns of narration in the history of the commercial narrative film, viewed as an artistic medium and as a system requiring the massive consumption of artifacts. Emphases placed upon the early articulation of a cinematic means of narration, realism as an artistic style, the nature and functions of popular film, and the modes of modernist and post-modernist narration. Major figures discussed include Griffith, Eisenstein, Murnau, Von Stroheim, Dreyer, Chaplin, Renoir, Ford, Hitchcock, Welles, Antonioni, Fellini, Bergman, Bunuel, Resnais, Godard, Jansco and Herzog. Students majoring in film should have previously taken Theatre Arts 274.

[THETR 376 History and Theory of Documentary and Experimental Film.
Fall. 4 credits. Fee for screening expenses, $10 (paid in class). Prerequisite: Theatre Arts 274 is strongly recommended, but not required. Offered alternate years; not offered 1992–93. Next offered 1993–94.
T R 1:25–4:25. D. Fredericksen.
First, the history and theory of documentary form up to the end of World War II. Major figures covered include Vertov, Flaherty, Ivens, Grierson, Lorentz, Riefenstahl, Capra, Hurwitz, and Jennings. Second, within the history and theory of the experimental and personal film form, emphases are: the avant-garde film of the twenties in Germany, France, U.S.S.R., and the U.S., the movement toward documentary practice in the thirties, and American experimental and personal film from the forties to the present. Major figures covered in this latter period include Deren, Brakhage, Baillie, Belson, the Whitneys, Hill, Snow, Pitt, L. Jordan, H. Smith, G. Nelson and Mekas.]

THETR 377 Fundamentals of 16mm Filmmaking
Fall and spring. 4 credits. Limited to 12 students. Intended for juniors and seniors (who may need to sign up a year or more in advance). Prerequisite: Theatre Arts 274 (or higher-level film studies course) and permission of instructor. Fee for maintenance costs, $50 (paid in class). The average cost to each student for materials and processing is $350.
M W F 2–4:25. M. Rivchin.
A hands-on course in the basics of 16mm filmmaking techniques, requiring no prior production experience. Each student will complete a number of short film projects to explore narrative, experimental, documentary, animation, and abstract genres. A longer, final sound film project will be screened publicly.

THETR 378 Russian Film of the 1920s and French Film of the 1960s
Spring. 4 credits. Fee for screening expenses, $10 (paid in class). Prerequisite: Theatre Arts 375 is strongly recommended, but not required.
T R 1:25–4:25. D. Fredericksen.
An intensive treatment of two distinct periods of innovation in film theory and history. Emphasis on the vital relationship between theory and practice in these two periods. Major figures include Eisenstein, Pudovkin, Vertov, Dovzhenko, Room, Godard, Truffaut, Resnais, Eustache, Rivette, Rouch and Bresson.

[THETR 379 Documentary Film from 1945 to present
Spring. 4 credits. Prerequisite: Theatre Arts 376 or permission of the instructor. Fee for screening expenses, $10 (this fee is paid in class). Offered alternate years; not offered 1992–93. Next offered 1993–94.
T R 1:25–4:25. D. Fredericksen.
Emphases on the contemporary documentary film as a sociopolitical force, as an ethnographic tool within and without a filmmaker's own culture, and as an artistic form with a distinct history and set of theoretical questions. Major figures, structures, and movements covered include Jennings, Rouquier, Leacock, Malle, Rouch, Solanas, national film boards, Challenge for Change, direct cinema, cinema verite, revolutionary documentary of the Third World and feminist documentary. The scope is international.]

[THETR 389 Luis Buñel and the Cinema of Poetry (also Spanish Literature 379)
Spring. 4 credits. Taught in English. Films with subtitles. Not offered 1992–93.
Screenings to be arranged. A. Monegal.
See Spanish Literature 379 for course description.]

[THETR 396 German Film (also Comparative Literature 396 and German Studies 396)
Spring. 4 credits. Not offered 1992–93. Requirements: participation in class discussion, one paper, midterm, and final.
D. Bathrick.
The goal of the course is to explore the form and context of German film in relation to the cultural and sociopolitical context of which it is a part. Accordingly, the material discussed will be divided into three major periods: Weimar film, 1918–1933; Nazi film, 1933–45; postwar film, 1945–present. Readings and lectures will be devoted to formal and cultural developments in the history of German film as well as interpretive analysis of selected individual films. In both lectures and discussions, particular emphasis will be placed on helping students develop an appropriate method of viewing and analyzing films.]

THETR 413 Film and Performance
Fall. 4 credits. Prerequisite: permission of the instructors. Open to intermediate film, video, dance, and dance composition students. Limited to 12 students. $50 maintenance fee to be paid in class.
T R 2:30–4:25. M. Rivchin and J. Self.
Special topic for 1992: Dance, Film, and Gender. Can the representation of the body be abstract, de-sexualized or de-gendered? Providing a context for the creation of collaborative work among dancers, filmmakers, and choreographers, this course will be an exploration of the questions around representation of the body (e.g., romanticism, voyeurism, eroticism, etc.) and of changing gender roles occuring in contemporary dance/performance in relation to film and video. Studies and projects will include viewings, critical reading and discussion of historical examples of dance films from Hollywood to the avante-garde, and styles and effects of dance documentation, cine-dance and live performance/media presentations will lead to production of work in these modes. Material costs for videotape and/or 16mm film will average $100–150 per student.

[THETR 475 Seminar in the Cinema I (also College Scholar Seminar)
Spring. 4 credits. Limited to twenty students. Offered alternate years; not offered 1992–93. Next offered 1993–94.
T R 10:10–12:05. D. Fredericksen.
Topics for 1994: Jung, film, and the process of self-knowledge. "Know thyself": this has been called our culture's most enduring psychological need, and it has been frequently offered as the *raison d'etre* for liberal studies. C. G. Jung's answer to how one might "know oneself" is based on his claim that "image is psyche"; his informing metaphor is depth. The seminar will trace the elaborations of this position in Jung, James Hillman, Russell Lockhart, Marion Woodman, and Murray Stein. It will also test the critical capacities of this position with respect to film images given us by Bergman, Fellini, Stan Brakhage, Gunvor Nelson, Suzan Pitt, Larry Jordan, Bruce Baille, and others. The manner in which Jung's claim might provide an archetypal and imaginal alternative to current approaches to liberal studies will be asked throughout the seminar; the nature of education will thereby become a central theme of the semester's work.]

THETR 476 Seminar in the Cinema II
Spring. 4 credits. Prerequisite: THETR 274 or 375 or comparable experience in film analysis, or a background in contemporary literary theory. Limited to twenty students. Offered alternate years; in 1995 the topic will be different.

T R 9:05–12:05. D. Fredericksen.
Topic for 1993: David Bordwell's *Making Meaning: Inference and Rhetoric in the Interpretation of Cinema* and Jerome Bruner's *Acts of Meaning*. Our work will consist of a careful and reflective consideration 1) of the theses put forth by these two recent books, 2) of the contexts in which they take place, and 3) of the responses they have generated in other film scholars and psychologists.

THETR 477 Intermediate Film Projects
Spring. 4 credits. Limited to 6 students. Prerequisite: Theatre Arts 377 or equivalent, and permission of instructor. Fee for maintenance costs, $50 (this fee is paid in class). The minimum cost to each student for materials and processing is $500 for film (however, sync-sound films typically average $1500–2000). Students retain ownership of their films.

MW 10:10–12:05. M. Rivchin.
The development and completion of individual projects, with emphasis on personal, narrative, and documentary modes. Includes preparation of an original script or storyboard, direction, cinematography, and the option of synchronous-sound recording, editing, and follow-through to a composite print.

THETR 493 Advanced Film Projects
Summer. 4 credits. Limited to 12 students. Prerequisite: TA 280, 281, or 377 or equivalent and permission of instructor. Maintenance fee, $50.

M. Rivchin.
Students work in small crews to produce a short dramatic film and/or short documentary film, using synchronous sound filming and editing equipment and/or super-VHS video. Equipment is provided, but students must pay for film and processing (average cost, $400) or videotape (average cost $100).

THETR 653 Myth onto Film (also Anthropology 653)
Fall. 4 credits. Open to undergraduate and graduate students with permission of instructor. Enrollment limited by available studio space and equipment. Prerequisite: some knowledge of any one of the following: anthropology, filmmaking, mythology, graphics, drawing, and painting.

W 2–4:25. R. Ascher.
See Anthropology 653 for course description.

[THETR 699 German Film Theory (also German Studies 699 and Comparative Literature 699)
Spring. 4 credits. Not offered 1992–93. Offered occasionally.

D. Bathrick.
This course will examine critically the writings of major German film theories from the Weimar period to the present. Works by Bela Balazs, Rudolf Arnhelm, Siegfried Kracauer, Walter Benjamin, Theodor Adorno, Max Horkheimer, Alexander Kluge, H. J. Syberberg, Gertrud Koch, Thomas Elsaesser, and others will be read and discussed in light of the following considerations: What are the cultural and political contexts out of which these ideas emerge and how are these theories addressing these contexts? How do these theories relate to the work coming out of other national traditions at the same time or to current debates in feminist, formalist, postmodern, or poststructuralist film theory. There will be film showings.]

DANCE

THETR 123 Ballet I (also Physical Education 423)
Fall and spring. 0 credit. Satisfies the PE requirement. Attendance at dance concerts is required.

Theatre Arts and Physical Education registration at Teagle Hall only. M W 12:30–2. B. Suber.
The fundamentals of classical ballet technique. Material covered includes all of the exercises at the barre, and elementary work in the areas of port de bras, adage and allegro.

THETR 124 Modern Dance I (also Physical Education 424)
Fall and spring. 0 credit. Theatre Arts and Physical Education registration at Teagle Hall only. Satisfies the PE requirement. Attendance at dance concerts is required.

Fall. Sec. 01 M W 1:30–3. J. Chu. Sec. 02 T R 11:20–12:50. J. Self. Spring. Sec. 01 M W 1:30–3. J. Chu. Sec. 02 T R 1:30–3. J. Kovar.
The fundamentals of modern dance technique. Elementary dance movement phrases, with attention to rhythm, placement, and vitality of performance. Satisfies the PE requirement.

THETR 155 Rehearsal and Performance
Fall and/or spring. 1–2 credits. 1 credit per production experience per term up to 2 credits per term. Students must register for the course in the term in which credit is earned; requests for retroactive credit will not be honored. Limited to students who are assigned roles after tryouts at the dance program's auditions. Students should add this course only after they have been assigned roles. S-U grades only.

Staff.
The study, development, and performance of roles in departmental theatre or dance productions or the study and practice of directing as experienced in assisting faculty and guest directors.

THETR 200 Introduction to Dance: Dancers and Choreographers
Fall. 3 credits. Attendance at dance concerts is required.

T R 11:40–12:55. J. Chu.
This course will explore the nature of dance by focusing each week on a certain dancer and choreographer—including Taglioni *fille* and *père*, Nijinsky and Fokine, Farrell and Balanchine—and on dancers who were their own choreographers—including Duncan, Astaire, and Cunningham. In studying the relation of dancer and choreographer, we shall be exploring the relation of body and mind, sex and eros, self and other, self and self. With weekly screenings and selected criticism.

THETR 201 Dance Improvisation
Fall. 3 credits. Limited to 12 students. Concurrent enrollment in a dance technique class at the appropriate level is required. Registration only through department roster in the main office of the Center for Theatre Arts. Attendance at dance concerts is required.

T R 4:50–6:20. J. Morgenroth.
The ambition of this course is to coax inspiration, to make it reliable, and to keep it surprising. The group works together to explore how fugitive movement can embody personal expression and animate structure. Live musical accompaniment, in private and public spaces, with performance and otherwise.

[THETR 209 Introduction to African Dance (also AS&RC 209) ⊕
Fall. 3 credits. Not offered 1992–93.

Staff.
An introduction to ancient African dance forms, origins, socio-economic and political significance; the state of the dances, changes and continuing relevance in contemporary times. This course will look at the evolution and significance of contemporary dance forms.]

THETR 210 Beginning Dance Composition and Music Resources
Spring. 3 credits. Concurrent enrollment in a dance technique class at the appropriate level is required. Registration only through the department roster in the main office of the Center for Theatre Arts. Attendance at dance concerts is required.

MW 6:30–8:30. Fogelsanger and Chu.
Weekly assignments are designed to introduce students to basic elements of dance traditionally and currently used in the choreographic process. Problems are defined and explored through class improvisation as a way to encourage fresh, individual solutions. Students compose and present a series of short studies that are discussed and reworked before being performed at informal studio showings. The music resource faculty will introduce the class to contemporary music for modern dance and orient the class regarding problems and possibilities with sound collaborations. Students are required to attend campus dance activities for class discussion.

THETR 211 Dance Composition Workshop
Summer. 3 credits. Limited to 15 students.

M–F 9:30–12. J. Self.
Students learn about the elements of making and performing dances and prepare short studies each week based on material covered in class. Modern-dance technique, improvisation, and composition are covered. Students observe and discuss the main concerns of contemporary performance from the artist's/performer's point of view. Viewings of films, videotapes, and live performances.

THETR 231 Ballet II (also Physical Education 431)
Fall and spring. 0 credit. Theatre Arts and Physical Education registration at Teagle Hall only. Prerequisite: Theatre Arts 123 (Ballet I) or permission of instructor. Satisfies the PE requirement. Attendance at dance concerts is required.

T R 3:10–4:40. B. Suber.
A continuation of Ballet I for students with at least a year of dance training. In addition to more advanced forms of port de bras, adage and allegro, work is done on the pirouette.

THETR 232 Modern Dance II (also Physical Education 432)
Fall and spring. 0 credit. Theatre Arts and Physical Education registration at Teagle Hall only. Prerequisite: Modern Dance I or permission of instructor. Satisfies the PE requirement. Attendance at dance concerts is required.

T R 1:30–3. J. Chu.
A continuation of Modern Dance I, for students with at least a year of dance training. Practice of longer dance phrases, with attention to clarity of design, rhythm, and expression.

THETR 233 Explorations in Movement and Performance A (also Physical Education 440)
Fall. 0 credit. Limited to 16 students. Attendance at dance concerts is required.
M W 4:50–6:20. J. Self.
This course delves into the possibilities of movement and performance, utilizing unconventional techniques such as animal movements, follow the leader games, improvisation and visualization. The course is physically demanding and requires an eagerness to investigate the nature of performance and explore unfamiliar territory in movement.

THETR 304 Ballet III (also Physical Education 434)
Fall and spring. 0 or 1 credit. May be repeated for up to 4 credits. Prerequisite: Ballet II or permission of instructor. Satisfies the PE requirement. Attendance at dance concerts is required.
M W F 3:10–4:40. B. Suber.
Study and practice of traditional training exercises and the classical ballet vocabulary; work is done on strengthening the body and using it as an expressive instrument.

THETR 305 Explorations in Movement and Performance B (also Physical Education 440)
Spring. 0 or 1 credit. Explorations A or permission. May be repeated for up to 4 credits. Limited to 16 students. Satisfies the PE requirement. Attendance to dance concerts is required.
M W 4:50–6:20. J. Self.
This course continues the investigations of Explorations A with special emphasis on working with music of the 20th century, and contemporary dance/film/video.

THETR 306 Modern Dance III (also Physical Education 436)
Fall and spring. 0 or 1 credit. May be repeated for up to 4 credits. Prerequisite: Modern Dance II or permission of instructor. Satisfies PE requirement. Attendance at dance concerts is required.
M W F 4:50–6:20. J. Morgenroth.
Advanced work with rhythm, placement, and phrasing for students who are prepared to refine technical skills of dancing. Students will be physically and mentally challenged by lengthy, complex phrases and will be expected to bring the instructor's material to life.

[THETR 307 Asian Dance and Dance Drama (also Asian Studies 307) @
Fall. 3 credits. May be repeated for credit. Section 1: Indian Dance, Section 2: Japanese Noh Theatre, Section 3: Indonesian Dance Theatre. Not offered 1992–93.
Staff.
Readings, lectures, and practice sessions. On Fridays there will be lectures, demonstrations, and discussions. Videotapes and films will be shown. The Monday and Wednesday classes will consist of learning basic movement vocabulary and dances. No previous experience in dance is necessary.]

THETR 308 Modern Dance IV (also Physical Education 438)
Fall and spring. 0 or 1 credit. May be repeated for up to 4 credits. Prerequisite: Modern Dance III or permission of instructor. Satisfies PE requirement. Attendance at dance concerts is required.
Fall: T R F 4:50–6:20. J. Kovar. Spring: T R F 4:50–6:20. J. Self.
A continuation of, and supplement to, Theatre Arts 306/Physical Education 436.

[THETR 309 African Dance Aesthetics (also AS&RC 309) @
Spring. 3 credits. Prerequisite: TA and AS&RC 209 or permission of instructor. Attendance at dance concerts is required. Not offered 1992–93.
Staff.
An examination of African dance styles and forms within the cultural perspective of African peoples. Practical classes will consist of learning basic movement vocabulary, techniques, and dances, with lectures on the cultural world view of the people. Practical sessions will explore the dynamics of African dances as nonverbal artistic forms communicating a world view, with an end of semester studio showing.]

THETR 310 Intermediate Dance Composition and Music Resources
Fall. 3 credits. Prerequisite: Theatre Arts 210. Attendance at dance concerts is required.
M 6:45–8 and hours to be arranged. A. Fogelsanger and staff.
The scheduled weekly meetings will be devoted to expanding the music vocabulary and skills of students through a survey of contemporary music for modern dance, discussion of the needs of musicians and choreographers in collaborations, and rhythmic studies. Students working on intermediate choreographic studies and projects to be presented in various performance situations. Work in progress will be critiqued by faculty and peers. Design problems in costuming and lighting will be approached, and students with particular interests in collaboration will have a forum in which to develop their ideas.

THETR 311 Intermediate Projects in Dance Composition
Fall and spring. 3 credits. Prerequisite: Theatre Arts 310. Attendance at dance concerts is required.
Fall: M 6:45–8 and time TBA. Spring TBA. Staff.
A continuation of Theatre Arts 310.

THETR 312 Physical Analysis of Movement
Spring. 3 credits.
T R 1:25–2:40. J. Morgenroth.
This course is an examination of human movement with particular attention to dance movement. Readings in texts on human anatomy, physiology, and Kinesiology and in Sweigard's *Human Movement Potential.* Guest lectures by experts in anatomy and health areas. Practical and laboratory work. Demonstration of dissection.

[THETR 314 Western Dance History I: Ballet #
Fall. 4 credits. Attendance at dance concerts is required. Not offered 1992–93.
Staff.
A history of the theatrical genre of ballet from its origins in the Renaissance court spectacles of Western Europe. We will study the flowering of the Romantic ballet in the early nineteenth-century France, the apotheosis of classical ballet in Russia, the revolution of the ballet stage fomented by Diaghilev's Ballets Russes at the turn of the century, the innovations of Balanchine, Ashton, and Tudor in England and America, and more recent "cross-over" ballets by postmodern choreographers.]

[THETR 315 Western Dance History II
Spring. 4 credits. Attendance at dance concerts is required. Not offered 1992–93.
Staff.
A history of modern dance since its origins at the beginning of the twentieth century. We will begin with the American forerunners of modern dance, including Isadora Duncan and study succeeding generations of dance pioneers in Germany, America, Japan, and Europe, concluding with a brief overview of postmodern dance. Issues of modernism and cultural identity will be examined.]

[THETR 318 Historical Dances #
Spring. 2 credits. Prerequisite: Ballet II or Modern Dance II. Attendance at dance concerts is required. Not offered 1992–93.
Staff.
A sampling of the social dances from the Renaissance to the present, with emphasis on pinpointing basic differences in movement styles and customs in the various periods. A major part of class time will be spent learning and performing the dances.]

THETR 410 Advanced Dance Composition I
Fall and spring. 3 credits. Prerequisite: Theatre Arts 310 and 311. Attendance at dance concerts is required.
Fall: M 6:45–8 and time TBA. Spring TBA. Staff.
Students work on advanced choreographic problems, to be presented in performance. Work in progress will be critiqued by faculty on a regular basis.

THETR 411 Advanced Dance Composition II
Fall and spring. Attendance at dance concerts is required.
Fall: M 6:45–8 and time TBA. Spring TBA. Staff.
A continuation of Theatre Arts 410.

THETR 413 Film and Performance
Fall. 4 credits. Prerequisite: permission of the instructors. Open to intermediate film, video, dance and dance composition. Limited to 12 students. $50 maintenance fee to be paid in class.
T R 2:30–4:25. M. Rivchin and J. Self.
See Theatre Arts "Film" 413 for course description.

THETR 418 Seminar in History of Dance
Spring. 4 credits. Prerequisite: General knowledge of dance history recommended. Attendance at dance performances required.
R 10:10–12:05. J. Self.
Through viewing of video, film, live performances, critical readings, and class discussion, this course will investigate gender and sexual roles as they have occurred throughout dance history. Each student will be responsible for researching and reporting on a given topic, which could include women's roles in dance, men playing women, the presence of homosexuality in mainstream concert dance, gender-binding in avant-garde performance, and minimalist attempts to "de-sexualize" or "abstract" the body.

THETR 490 Senior Paper in Dance
Spring. 4 credits. Prerequisite: Theatre Arts 418, senior standing. Attendance at dance concerts is required.
Under faculty direction, the student will write a senior paper in dance history, criticism, or theory.

Tracks toward selection into the advanced undergraduate theatre program

Design, Technology, and Stage Management

Required for ALL individuals interested in a **Design**, **Technology**, or **Stage Management** track:
THETR 151 and 251 Production Lab I and II (at least 2 combined credits)
THETR 250 Fundamentals of Design and Technology

Required for Scenic Design emphasis:
THETR 351 Production Lab III (at least 4 credits)
THETR 354 Stagecraft Studio
THETR 364 Scene Design Studio

Required for Costume Design emphasis:
THETR 351 Production Lab III (at least 1 credit)
THETR 356 Costume Construction Studio
THETR 358 Theatrical Make-up Studio
THETR 366 Costume Design Studio I & II

Required for Lighting Design emphasis:
THETR 252 Technical Production Studio I
THETR 340 Theatrical Drafting and Technical Drawing Studio
THETR 351 Production Lab III (at least 1 credit)
THETR 362 Lighting Design Studio I

Required for Sound Design emphasis:
THETR 252 Technical Production Studio I
THETR 351 Production Lab III (at least 1 credit)
THETR 354 Stagecraft Studio
THETR 368 Sound Design Studio

Required for Technical Direction emphasis:
THETR 252 Technical Production Studio I
THETR 340 Theatrical Drafting and Technical Drawing Studio
THETR 351 Production Lab III (at least 1 credit)
THETR 354 Stagecraft Studio

Required for Stage Management emphasis:
THETR 253 and **THETR 353** Stage Management Lab II and III
THETR 280 Introduction to Acting
THETR 370 Stage Management Studio
THETR 398 Fundamentals of Directing I

Acting

Required for ALL individuals interested in an acting track:
THETR 151 and **THETR 251** Production Lab I and II (at least 2 combined credits)
THETR 240/241 Introduction to Western Theatre (1 Semester ONLY)
THETR 250 Fundamentals of Design and Technology
THETR 280 Introduction to Acting

Required for Acting emphasis:
THETR 281 Acting I
THETR 282 Introduction to Voice and Speech for Performance
or
THETR 284 Speech and Dialects for Performance
THETR 380 Acting II
Be accepted into THETR 381 Acting III

Directing

Required for ALL individuals interested in a directing track:
THETR 151 and **THETR 251** Production Lab I and II (at least 2 combined credits)
THETR 240/THETR 241 Introduction to Western Theatre (1 Semester ONLY)
THETR 250 Fundamentals of Design and Technology
THETR 280 Introduction to Acting

Required for Directing emphasis:
THETR 398 Directing I
THETR 498 Directing II

Playwriting

Required for ALL individuals interested in a playwriting track:
THETR 240/THETR 241 Introduction to Western Theatre (1 Semester ONLY)
THETR 250 Fundamentals of Design and Technology
THETR 280 Introduction to Acting

Required for Playwriting emphasis:
THETR 348 Playwriting
THETR 349 Advanced Playwriting

Students in the advanced undergraduate training program may also elect to take TA 485 (Undergraduate Internship) in addition to or in place of one production assignment.

TURKISH

See Department of Near Eastern Studies.

UKRAINIAN

See Department of Modern Languages and Linguistics.

VIETNAMESE

See Department of Modern Languages and Linguistics.

WRITING PROGRAM

See John S. Knight Writing Program, p. 304.

YIDDISH

See Department of Near Eastern Studies.

YORUBA

See Department of Modern Languages and Linguistics.

SPECIAL PROGRAMS AND INTERDISCIPLINARY STUDIES

Africana Studies and Research Center

L. Edmondson, director (255-5218); A. Adams (on leave), B. Blacksher, W. Branch, V. Carstens, W. Cross, S. Greene (on leave, spring 1993), R. Harris, A. Mazrui, A. Nanji, D. Ohadike, J. Turner, M. Williams. Offices: 310 Triphammer Road, 255-4625 or 255-4626.

The Africana Studies and Research Center is concerned with the examination of the history, culture, intellectual development, and social organization of Black people and cultures in the Americas, Africa, and the Caribbean. Its program is structured from an interdisciplinary and comparative perspective and presents a variety of subjects in focal areas of history, literature, social sciences, and Swahili language and literature.

The center offers a unique and specialized program of study that leads to an undergraduate degree through the College of Arts and Sciences and a graduate degree, the Master of Professional Studies (African and Afro-American), through the university's Graduate School.

A student may major in Africana studies; however, another attractive alternative is the center's joint major program. This program enables the student to complete a major in any of the other disciplines represented in the college while at the same time fulfilling requirements for a major in Africana Studies. This requires only a few more credits than is usually the case when one completes a single major course of study. Courses offered by the center are open to both majors and nonmajors and may be used to meet a number of college distribution requirements, such as freshman writing seminars, language (Swahili), expressive arts, humanities, social sciences, and history.

The center also brings distinguished visitors to the campus, sponsors a lecture series, and houses its own library.

The Africana Major

The undergraduate major offers interdisciplinary study of the fundamental dimensions of the Afro-American and African experiences. Because of the comprehensive nature of the program, it is to the students' advantage to declare themselves Africana majors as early as possible. The following are prerequisites for admission to the major.

Students should submit:

1) a statement of why they want to be an Africana studies major;
2) a tentative outline of the area of study they are considering (African or Afro-American) for the undergraduate concentration; and
3) a full transcript of courses taken and grades received.

The center's undergraduate faculty representative will review the applications and notify students within two weeks of the status of their request.

After acceptance as a major in the Africana Center, a student must maintain a C+ cumulative average in the center's courses while completing the major program. The Africana major must complete 36 credits in

courses offered by the center, to include the following four core courses: AS&RC 231, 290, 360, and 431. Beyond the core courses, the student must take 8 credits of center courses numbered 200 or above and 15 credits numbered 300 or above. Within this selection the student must take at least one of the following AS&RC courses: 203, 204, 283, or 301. The program of an undergraduate major may have a specifically Afro-American focus or a specifically African focus.

Joint Majors

The center encourages joint majors in the College of Arts and Sciences and in other colleges. Joint majors are individualized programs that must be worked out between the departments concerned. The center's undergraduate faculty representative, Professor Adams, will assist students in the design and coordination of joint major programs. However, in any joint major program, the center will require at least 16 credits be taken in Africana studies courses, including AS&RC 290.

Double Majors

In the case of double majors (as distinct from joint majors) students undertake to carry the full load of stipulated requirements for a major in each of the two departments they have selected.

Certificate in African Studies

In conjunction with the Institute for African Development, the Africana Studies and Research Center administers an undergraduate Certificate in African Studies program. The certificate is offered as a minor concentration available to students in all of the undergraduate colleges at Cornell. Many of the courses in the program might be used to fulfill other course distribution requirements. By pursuing this certificate, students acquire an interdisciplinary understanding of Africa. After developing a foundation of knowledge on the culture, society, and development of Africa in the core course "Africa: The Continent and Its People," students pursue 15 credit hours in a humanities or development studies track or a combination of the two, including an additional core course, either "African Civilizations and Cultures" or "Contemporary African Development Issues." The requirements for the cetificate are a minimum of 18 credit hours, including the core courses. Students interested in the certificate program must contact Professor Adams (the center's undergraduate faculty representative) who will register them in the program and assign them a faculty adviser from their own college. The faculty adviser will be responsible for determining completion of the certificate requirements.

Honors. The honors program offers students the opportunity to complete a library research thesis, a field project in conjunction with a report on the field experience, or a project or experiment designed by the student. The requirements for admission to the honors program for all students—regular majors, joint majors, and double majors—are a B- cumulative average in all courses and a B+ cumulative average in the center's courses. Each student accepted into the honors program will have an honors faculty committee consisting of the student's adviser and one additional faculty member, which is responsible for final evaluation of the student's work. The honors committee must approve the thesis or project before May 1 of the student's junior year. The completed thesis or project should be filed with the student's faculty committee by May 10 of the senior year.

Distribution Requirement

Two Africana Studies and Research Center courses from the appropriate group may be used in fulfillment of the following distribution requirements:

Social sciences: AS&RC 171, 172, 190, 191, 208, 231, 280, 290, 301, 302, 344, 345, 346, 351, 352, 400, 410, 420, 451, 460, 481, 484, 485, 495, 550, 551, 571.

History: AS&RC 203, 204, 205, 283, 344, 350, 360, 361, 370, 381, 405, 460, 471, 475, 482, 483, 490, 510.

Humanities: AS&RC 202, 211, 219, 422, 425, 431, 432, 450, 455, 525.

Expressive arts: AS&RC 209, 285, 303, 425, 430.

Freshman writing seminars: AS&RC 100.

Language Requirement

Swahili fulfills the College of Arts and Sciences language requirement. Successful completion of AS&RC 131, 132, 133, and 134 provides qualification in Swahili. Successful completion of AS&RC 202 gives proficiency in Swahili. Africana majors are not required to take Swahili, but the center recommends the study of Swahili to complete the language requirement. Yoruba and Mandinka courses cross-listed with DMLL Yoruba and Mandinka courses also fulfill the language requirement.

Courses

AS&RC 121 Sec 01 Beginning Yoruba
Fall. 4 credits.
V. Carstens and staff.
Foundation provided in all basic language skills, with an emphasis on speech and aural comprehension. Classes provide speaking and listening practice.

AS&RC 121 Sec 02 Elementary Mandinka
Fall. 4 credits.
V. Carstens and staff.
Foundation provided in all basic language skills, with an emphasis on speech and aural comprehension. Classes provide speaking and listening practice.

AS&RC 122 Sec 01 Beginning Yoruba
Spring. 4 credits. Prerequisite: AS&RC 121, Sec. 01.
V. Carstens and staff.
Foundation provided in all basic language skills, with an emphasis on speech and aural comprehension. Classes provide speaking and listening practice.

AS&RC 122 Sec 02 Elementary Mandinka
Spring. 4 credits. Prerequisite: AS&RC 121, Sec. 02.
V. Carstens and staff.
Foundation provided in all basic language skills, with an emphasis on speech and aural comprehension. Classes provide speaking and listening practice.

AS&RC 123 Sec 01 Continuing Yoruba
Fall. 4 credits. Prerequisite: AS&RC 121 & 122, Sec. 01.
V. Carstens and staff.
Building on AS&RC 121–122 this is an all-skills course with a functional emphasis. Class will be conversational.

AS&RC 123 Sec 02 Continuing Mandinka
Fall. 4 credits. Prerequisite: AS&RC 121 & 122, Sec. 02.
V. Carstens and staff.
Building on AS&RC 121–122 this is an all-skills course with a functional emphasis. Class will be conversational.

AS&RC 131 Swahili
Fall. 4 credits.
A. Nanji.
Beginner's Swahili. Part 1—Grammar. Requires no knowledge of language.

AS&RC 132 Swahili
Spring. 4 credits. Prerequisite: Swahili 131.
A. Nanji.
Continued study of the basic grammatical formation of the language and the introduction of reading material ranging from songs to short stories. A great many drills help develop the student's comprehension. Swahili tapes are highly used.

AS&RC 133 Swahili
Fall. 4 credits. Prerequisites: Swahili 131 and 132.
A. Nanji.
Advanced study in reading and composition.

AS&RC 134 Swahili
Spring. 4 credits. Prerequisite: Swahili 133.
A. Nanji.
In this course of the sequence more emphasis is placed on the development of reading ability and the acquisition of writing skills. Students are expected to read and comprehend selected Swahili stories and write compositions on chosen topics. Ample consideration is given to oral practice in the classroom.

AS&RC 171 Black Families and the Socialization of Black Children
Fall. 4 credits.
W. Cross.
Survey of key psychological dimensions of the Black experience, covering such issues as (1) Race and Intelligence; (2) Black Identity; (3) Black Family Structure; (4) Black English; (5) Black Middle Class; and (6) Nature of Black Psychology.

AS&RC 172 The Education of Black Americans: Historical and Contemporary Issues
Spring. 4 credits.
W. Cross.
This is a course will be devoted to the history of Black education along with contemporary issues in Black education, such as the struggle for Black Studies, the development of independent Black schools, and problems of public schools in Black communities.

[AS&RC 190 Introduction to Modern African Political Systems
4 credits. Not offered 1992–93.]

AS&RC 191 Africa: The Continent and Its People
Fall. 3 credits.
L. Edmondson.
An introductory interdisciplinary course focusing on Africa's geographical, ecological, and demographic characteristics; indigenous institutions and values; the triple cultural heritage of Africanity, Islam, and Western

civilization; main historical developments and transitions; contemporary political, economic, social, and cultural change. Africa's ties with the United States (from trans-Atlantic slavery to the present), its impact on the emerging world order, and its contribution to world civilization will also be explored.

AS&RC 202 Swahili Literature
Fall. 4 credits. Prerequisite: Swahili 134.
A. Nanji.
Students gain mastery over spoken Swahili and are introduced to the predominant Swahili literary forms.

AS&RC 203 Sec 01 Intermediate Yoruba
Spring. 3 credits. Prerequisite: AS&RC 123, Sec. 01
V. Carstens and staff.
Intermediate conversation, grammer and composition.

AS&RC 203 Sec 02 Intermediate Mandinka
Spring. 3 credits. Prerequisite: AS&RC 123, Sec. 01
V. Carstens and staff.
Intermediate conversation, grammer and composition.

AS&RC 204 History and Politics of Racism and Segregation
Fall. 4 credits.
S. Greene.
The course will deal with historical and/or contemporary patterns of racism and segregation. The study will be undertaken within a theoretical framework that broadly defines racism and segregation and their implication.

AS&RC 205 African Civilizations and Culture
Spring. 3 credits.
D. Ohadike.
May be used for history requirement. This course is concerned with the development of African civilizations and cultures from the earliest times to the present day, together with their contributions to world history. The aim is to promote the understanding of Africa and the appreciation of its cultural forms through the study of the continent's social, political, and economic structures. The approach is multidisciplinary. The course deals with the civilizations of North Africa, the Nile Basin, and Ethiopia (examples: Carthage, Egypt, Kush, and Meroa); the kingdoms and empires of Sub-Saharan Africa (examples: Ancient Ghana, Mali, Songhai, Oyo, Benin, Kongo, and Nwene Mutapa); African kinship systems; religions; healing systems, music, political philosophy, and mechanisms of social control. The course also looks at the impact of Islam and Christianity on the development of African cultures.

[AS&RC 208 Gender, Race, and Medical "Science"
3 credits. Not offered 1992–93.]

[AS&RC 211 West Indian Literature from Abroad
3 credits. Not offered 1992–93.
A. Adams.
"Writing home": writing by West Indians who have emigrated to North America, Europe, or Africa, but whose cultural, social, psychological, spiritual center of gravity remains the Caribbean (or its transplanted manifestation in the new domicile). Whether experienced as "exile," as with Lamming, "loneliness," as with Selvon, or as a search for the diasporic connection with the continent of ancestry, as with Conde, the West Indian literary artist abroad is, in some form, "writing home."]

[AS&RC 219 Issues in Black Literature
4 credits. Not offered 1992–93.]

AS&RC 231 African American Social and Political Thought
Spring. 3 credits. Offered in alternate years.
J. Turner.
This is an introductory course that will review and analyze the major theoretical and ideological formulations developed and espoused by African-Americans in the struggle for liberation. This semester we will focus specifically on the political philosophy and historical significance of Malcolm X, and the work and movement of Marcus Garvey, as the prime movers of nationalism and pan-Africanism among Black people in this century. Such themes as slave resistance, nationalism, Pan-Africanism, emigration, anti-imperialism, socialism and internal colonialism, and the political and social views of Black women will be discussed. Black political thought will be viewed in its development as responses to concrete conditions of oppression and expression.

AS&RC 271 Introduction to African Development (also City and Regional Planning 271 and Government 271)
Spring. 3 credits.
This course will consider diversity within Africa; colonial/post-colonial legacy; tensions between "center" and "periphery" within countries; key linkages among agriculture, food, nutrition, and poverty; significance of human resources (health, education, and women's role in development); pressures on natural resource base; links to the international economy.

AS&RC 280 Racism in American Society
Fall. 3 credits.
D. Barr and J. Turner.
This course will be a topical treatment of the history and theory of racism in the United States. The course will begin with an examination of basic concepts and theories of racism. From there we will examine the history of racial groups in America, African-Americans, Native Americans, Asian Americans, and the Hispanic groups. Particular attention will be paid to the political economy of racism and the sociological and the psychological aspects of race relations in America, with specific reference to the differences and intersections of race, class, gender, and ethnicity.

[AS&RC 283 Black Resistance: South Africa and North America
4 credits. Not offered 1992–93.]

AS&RC 285 Black Theater and Dramatic Literature
Fall. 3 credits.
W. Branch.
This course is an introduction to the history of literature of Black American Drama. It also provides an opportunity for students to cultivate an interest in individual and group presentation of Black dramatic materials. Students who successfully complete this course will be granted preference for the limited enrollment in AS&RC 425 (Advanced Seminar in Black Theatre and Dramatic Literature), which produces a public performance in the spring.

AS&RC 290 The Sociology of the African-American Experience
Fall. 3 credits.
J. Turner.
This is an introductory course to the field of Africana Studies. It assumes a historical/sociological approach to the examination of the African-American experience. The course surveys the African beginnings of human kind and the classical role of Black people in world civilization and the making of early culture. The course treats issues in the humanities, social sciences, and history. This course is required for all undergraduate students majoring at the Africana Center.

[AS&RC 301 Oppression and the Psychology of the Black Social Movement
4 credits. Not offered 1992–93.
W. Cross.]

[&RC 302 Social and Psychological Effects of Colonialization and Racism
4 credits. Not offered 1992–93.]

AS&RC 303 Blacks in Communication Media
Spring. 3 credits.
W. Branch.
The focus is on the general theory of communications, the function of media in an industrialized society, and the social, racial, and class values implied in the communication process. There is a term paper, and the screening of significant American and Third World films.

AS&RC 311 Government and Politics in Africa
Fall. 4 credits.
A. Mazrui.
Power and political participation in Africa. The colonial background and its political consequences. The pre-colonial continuities in the post-colonial politics. Ethnicity and allegiance in the African polity. The monarchical tendency in African political culture. From the warrior tradition to the military coup in the post-colonial era. From the elder tradition to presidential gerontocracy. From the sage tradition to intellectual meritocracy. Class *versus* ethnicity in African politics. The one-party *versus* the multiparty state. Socio-cultural *versus* socio-economic ideologies. The gender question in African politics. The soldier and the state. The African political experience in a global context.

[AS&RC 344 Neocolonialism and Government in Africa (The Politics of Public Administration)
4 credits. Not offered 1992–93.]

[AS&RC 345 Afro-American Perspectives in Experimental Psychology (also Psychology 345)
3 or 4 credits. Prerequisite: an introductory course in psychology or AS&RC 171. Not offered 1992–93.]

[AS&RC 346 African Socialism and Nation Building
4 credits. Not offered 1992–93.]

[AS&RC 350 The Black Woman: Social and Political History
3 credits. Not offered 1992–93.]

[AS&RC 352 Pan-Africanism and Contemporary Black Ideologies
4 credits. Not offered 1992–93.]

[AS&RC 360 Ancient African Nations and Civilizations
3 credits. Not offered 1992–93.]

[AS&RC 361 Introduction to Afro-American History (from African Background to the Twentieth Century)
Fall. 3 credits. Not offered 1992–93.
R. Harris.
Surveys the transition of Africans to America through the process of enslavement and their transformation into Afro-Americans. Explores the transition from slavery to freedom through the process of emancipation and the transformation of Afro-Americans from chattel slaves into rural peasants. Its purpose is to understand the internal dynamics of the Black experience from African origins to the age of segregation.]

AS&RC 370 Afro-American History: The Twentieth Century
Spring. 3 credits.
R. Harris.
Examines the transition of Afro-Americans from countryside to city through the process of migration and urbanization and their transformation into industrial laborers. Probes the transition from segregation to civil rights through the process of protest and the transformation of Afro-Americans from second-class into first-class citizens. The purpose is to understand historical antecedents for the current socioeconomic, political, and cultural status of Afro-Americans.

AS&RC 381 Contemporary African History
Fall. 3 credits.
D. Ohadike.
This is a survey of African history in the nineteenth and twentieth centuries. Important topics include the impact of Atlantic slave trade and its ending, European scramble and partition of Africa, resistance to European colonial conquest, African societies in the colonial period, independence and liberation movements, the rise of military regimes, Africa's relations with the rest of the world (especially with the USA, Western Europe, the Soviet Union and the Arab World), the new spiritual imperialism and religious conflicts, the IMF and the debt Crisis.

[AS&RC 382 Comparative Slave Trade of Africans in the Americas
3 credits. Not offered 1992–93.]

[AS&RC 400 Political Economy of Ideology and Development in Africa
4 credits. Not offered 1992–93.]

[AS&RC 405 Political History of the Age of Booker T. Washington and W. E. B. DuBois
4 credits. Not offered 1992–93.]

AS&RC 410 Black Politics and the American Political System
Spring. 4 credits.
J. Turner.
The central thesis of African American politics has been its movements for political change and democratic access and human rights. This development since the seventeenth century is a complex political legacy. This course will conduct a close study of African American political practice and theoretical analysis of the American political system. Implications of the political systems for prospects and limitations to participation by Black people will be analyzed. Critical historical stages in the process of Black politics will be examined. The development of electoral offices in federal and statewide politics, and the significant urban political power bases giving rise to African American mayorality politics in critical industrial centers, as well as rural hamlets will center the course. Presidential politics—the Jesse Jackson campaigns—and new political formations including Black Republicans/conservatives will constitute the emphasis on contemporary events. The course will review the development of the literature in African American politics.

AS&RC 411 African Americans and Jewish Americans: Identities, Parallels and Conflicts (also German Studies 411)
Spring. 4 credits.
W. Cross and S. Gilman.
The course will explore the identity issues affecting both groups and their interactions. It will focus on the cultural politics of both Jewish Americans and African Americans together with an analysis of their conflicts. An important secondary concern will be how gender definitions affect both groups. Further issues will deal with the broader question of "nationalism" and the myth of dual identity (Africa/Israel); the role urban identity has assumed in late twentieth-century America in defining as well as being defined by both groups. This is of interest as the urbanization of Jewish Americans and African Americans occurred over the first half of the twentieth century. A constant emphasis will be on parallels, intersections, and differences.

[AS&RC 420 Public Policy and the African American Urban Community
4 credits. Not offered 1992–93; next offered 1993–94.
J. Turner.
The socioeconomic conditions of the African American urban community will be the central focus of the course. Community development models will be explored in relationship to the social needs of the African American population. The changing configuration of internal organization of the African American community nationally will be examined.]

AS&RC 422 African Literature
Fall. 4 credits.
Women writers of Africa will be the focus of attention in this course. Questions of gender as well as complementary issues of equal importance in the artistic vision and expression of the woman writer in Africa will be considered in the works of Mariama Ba, Ama Ata Aldoo, Buchi Emecheta, Aminata Sow Fall, Bessie Head, as well as some "newer" writers. All works will be read in English.

AS&RC 425 Advanced Seminar in Black Theater and Dramatic Literature
Spring. 4 credits. Enrollment limited.
W. Branch.
This course will be devoted to the study, rehearsal, production, and public performance of a play or plays drawn from the annals of Black American dramatic literature. Students will participate in all the various phases and categories of theatrical production, from acting to production crews to theater group management. A field trip to a Black Theater attraction in New York City will also be arranged if possible. Students who have successfully completed AS&RC 285 (Black Theater and Dramatic Literature) will be granted preference for the limited enrollment in this course.

AS&RC 430 African American Creative Writing Seminar
Fall. 4 credits.
W. Branch.
A limited number of students who have expressed both interest and aptitude in creative writing will have theopportunity to concentrate on the production of a piece of writing in either fiction or drama that proceeds from an Afro-centric wellspring. In addition, students will gain critical standards of evaluation through the examination and discussion of "role-model" materials from African American literature and drama as well as considerations of the work of their fellow students in the seminar.

[AS&RC 431 History of Afro-American Literature
4 credits. Not offered 1992–93.]

AS&RC 432 Modern Afro-American Literature
Spring. 4 credits. Offered alternate years.
A study of fiction by Black writers, focusing on the political and sociological component that influenced the development and growth of Black writing in relationship to literary themes and attitudes current in specific periods and movements from post–World War I to the present.

[AS&RC 451 Politics and Social Change in the Caribbean
4 credits. Not offered 1992–93.
L. Edmondson.
A study of the historical, geostrategic, political, economic, and social (including racial and cultural) forces bearing on the domestic and international experiences of Caribbean societies. Special attention will be given to conflicting definitions and perceptions of the Caribbean; contending theories of Caribbean social structure and models of development; the continuing salience of struggles for change and transformation; prospects of regional integration; and Caribbean challenges to the global system, especially with regard to the region's relations with the United States in the context of the East-West conflict and its position in the Third World in the context of the North-South cleavage.]

AS&RC 455 Modern Caribbean Literature
Fall or spring. 4 credits.
This course will examine the prose literature of the Caribbean islands. Through the reading of several novels and short stories from the various languages and cultural strains that comprise the Caribbean societies, students will study the points of commonality and the diversity within this body of literature. The recurrence of certain historical, social, and cultural issues that have formed the multi-ethnic Caribbean peoples will be analyzed in their varying manifestations across the linguistic and other boundaries to uncover the underlying shared experience.

[AS&RC 460 African Philosophy and the Origins of Major Western Religions
4 credits. Not offered 1992–93.]

AS&RC 471 Black Emancipation in Comparative Perspective (also History 471)
Spring. 4 credits.
D. Ohadike.
This course will explore the black emancipation experiences in comparative perspective. Primary emphasis will be on Africa and the United States; secondary focus will be the Caribbean and Latin America. The African

component will investigate social consequences of emancipation, the transformations that accompanied that process, and experiences of ex-slaves. Perspectives on the Americas will include the complexities of emancipation, its socio-economic results and the legacy of race relations.

AS&RC 475 Black Leaders and Movements in Afro-American History
Fall. 4 credits.
R. Harris.
Analyzes the personalities, ideas, and activities central to the struggle for Afro-American liberation from the eighteenth-century to the present. Examines theories of leadership and the structure of protest movements with the goal of understanding current leadership needs and trends among Afro-Americans.

[AS&RC 481 Peoples, Culture and Sociology of Caribbean
4 credits. Not offered 1992–93.]

[AS&RC 482 African Labor History
Spring. 4 credits. Not offered 1992–93.
D. Ohadike.
This is an investigation of African labor history from pre-colonial to post-colonial times. Its aim is to chart the main course of African labor transformations and their impact on the continent's economic, political, and social developments. The course begins with an examination of the basic theory of labor and the concept of an African mode of production. It then goes on to survey pre-colonial African labor history, together with the international labor migrations. Finally, it examines colonial and post-colonial labor exploitation, transition to wage labor, female labor, and trade unions.]

AS&RC 483 Themes in African History
Fall. 4 credits.
S. Greene.
Designed to expose students to particular aspects of African history and historiography using, when necessary, work done in auxiliary disciplines. This year's theme, "Culture Contact and Cultural Transformations in Precolonial Africa" explores through case studies the precolonial interactions in ideas, peoples, and cultures; societal factors influencing the acceptance or rejection of new cultural forms; the extent to which the acceptance of new cultural forms affected relations of power, prestige, and gender, institutionally and materially.

[AS&RC 484 Politics, Conflict, and Social Change in Southern Africa
Fall or spring. 4 credits. Offered alternate years. Not offered 1992–93.
L. Edmondson.
The focus is on ongoing conflicts and transformations in South Africa and the salient issue of U.S. relations with that country. Topical emphases include the heightening contradictions of apartheid; the rising tide of Black resistance; women under and against apartheid; South Africa's relations with its neighbors; geopolitical, economic, and racial dimensions of the American connection; the disinvestment-divestment debate; the rise, fall, and consequences of the Reagan administration's "constructive engagement" policy; the prospects for transition to a nonracial democracy. Instructor's lectures will be supplemented by films and class discussions.]

[AS&RC 485 Racism, Social Structure, and Social Analysis Seminar
4 credits. Not offered 1992–93.]

[AS&RC 490 Advanced Reading and Research Seminar in Black History
4 credits. Not offered 1992–93.]

[AS&RC 495 Political Economy of Black America
4 credits. Not offered 1992–93.]

AS&RC 498–499 Independent Study
498–fall; 499–spring.
Hours to be arranged. Africana Center faculty.
For students working on special topics, with selected reading, research projects, etc., under the supervision of a member of the Africana Studies and Research Center faculty.

[AS&RC 500 Political Theory, Planning, and Development in Africa
4 credits. Not offered 1992–93.]

[AS&RC 501 Global Africa: Comparative Black Experience
Spring. 4 credits. Not offered 1992–93; next offered 1993–94.
A. Mazrui.
This seminar will address two diasporas in the Black experience. The *diaspora of enslavement* concerns slaves and descendants of slaves in both the Western and Eastern Diaspora. The *diaspora of colonization* concerns demographic dispersal as a result of colonialism. African-Americans are in their majority part of the Diaspora of Enslavement. Recent Algerian immigrants into France are part of the Diaspora of Colonization. Jamaicans and Trinidadians in Britain are part of a *double diaspora*—products of both enslavement and colonialism. The course will address these areas of Black comparison: Comparative Slavery—A Triple Heritage; Race and Race Mixture in Four Traditions; Comparative Emancipation from Slavery; Comparative Liberation from Colonialism; Comparative Struggle for Civil Rights; The Gender Question in Global Africa; Comparative Quest for Global Equality.]

AS&RC 505 Workshop in Teaching about Africa
4 credits. Prerequisites: AS&RC 204 or AS&RC 360 and 361 or permission of instructor. Offered alternate years.

AS&RC 510 Historiography and Sources: The Development of Afro-American History
Spring. 4 credits. Prerequisite: upperclass or graduate standing or permission of instructor.
R. Harris.
Studies the way Black historians in particular have explained the Afro-American past. Examines the development of writing on Afro-American history from the earliest writers to the present. Seeks to determine the principles for interpreting Afro-American history. Acquaints participants with the methodologies and sources central to understanding the Afro-American experience.

[AS&RC 515 Comparative Political History of the African Diaspora
Fall. 4 credits. Prerequisite: upperclass or graduate standing or two of the following courses: AS&RC 203, 204, 283, 360, 361, 475, 484, 490. Offered alternate years. Not offered 1992–93.
Staff.]

AS&RC 520 Historical Method, Sources, and Interpretation
Fall or spring. 4 credits. Prerequisite: upperclass or graduate standing or two of the following courses: AS&RC 203, 204, 361, 475, 484, 490. Offered alternate years.
Staff.

[AS&RC 530 Womanist Writing in Africa and the Caribbean
Fall. 4 credits. Not offered 1992–93.
M 1:25–3:55. A. Adams.
Theoretical essays on the nature, relevance, and articulation of feminist thought from African and Caribbean writers will complement literary texts. Gender issues, as manifested both at home and in emigrant situations abroad will be examined in texts by such writers as Sistren, Conde, Dangarembga, Aidoo, Warner-Vieyra, Ba, Emecheta, Kincaid, W. Mandela. (Francophone works may be read in the original by individuals who so desire.)]

[AS&RC 550 Transnational Corporations in Africa and Other Developing Countries
4 credits. Not offered 1992–93.]

AS&RC 571 Graduate Seminar in Black Psychology
Fall. 4 credits. Prerequisite: permission of instructor.
R 9:05–12:05. W. Cross.
This is an upper-level undergraduate and graduate seminar devoted to psychological issues in the Afro-American experience. This seminar will examine the theoretical and empirical literature of Black family–kinship systems and Black self-concept.

AS&RC 598–599 Independent Study
598–fall; 599–spring. Variable credit. For all graduate students.

AS&RC 698–699 Thesis
698, fall; 699, spring. Limited to Africana Studies and Research Center graduate students.

Agriculture, Food, and Society Concentration

A. G. Power, coordinator; G. Altschuler, M. M. Devine, emeritus; M. J. Esman, J. Fessenden MacDonald, C. C. Geisler, A. Gillespie, B. Ginsberg, C. J. Greenhouse, D. J. Greenwood, S. L. Kaplan, D. R. Lee, T. J. Lowi, T. F. Lynch, T. A. Lyson, P. L. Marcus, P. McMichael, V. Nee, D. I. Owen, D. Pimentel, N. T. Uphoff, D. Usner. Office: 275 Clark Hall, 255-6042.

Agriculture, food, and society is an interdisciplinary concentration that is designed to introduce students to the study of agricultural and food issues from diverse perspectives within the liberal arts. The concentration seeks to make available to students a coherent program of study in which the role of agriculture in modern or prehistorical-historical and developed or developing societies can be understood in biological, social, scientific, and humanistic perspective. The concentration draws on courses in several colleges—in particular the Colleges of Arts and Sciences, Agriculture and Life Sciences, and Human Ecology.

Members of the concentration committee, which consists of faculty from each of the major colleges from which courses in the concentration are drawn, serve as advisers in the program. The committee is administered

through the Biology and Society Major (office: 275 Clark Hall, 255-6042).

Basic Requirements

The requirements for the agriculture, food, and society concentration are designed to ensure a broad background in the biological, socioeconomic, and humanistic dimensions of agricultural and food issues. These requirements include foundation courses in biology plus a minimum of six courses and 18 credits of electives.

Students enrolling in the concentration should take the following foundation courses in biology to prepare themselves for course work in agricultural science: a two-semester introductory biology sequence selected from Biological Sciences 109–110, 105–106, or 101–102 plus 102–104. (Advanced placement in biology with a score of 4 or 5, or Biological Sciences 107–108, offered during the eight-week Cornell summer session, also satisfies the biological sciences requirement). These courses may be used to meet group 1 (physical or biological sciences) distribution sequence requirements in the College of Arts and Sciences.

It is recommended (but not required) that students in the agriculture, food, and society concentration elect one or more freshman writing seminars with agriculturally related content to meet basic college requirements for graduation. A list of agriculturally related freshman writing seminars to be offered in 1992–93 is available from the Biology and Society office.

For further information and a complete list of courses that can be used to fulfill the concentration requirements, students should contact the Biology and Society office, 275 Clark Hall, 255-6042.

American Indian Program

R. LaFrance, director (300 Caldwell Hall, 255-6587)

The American Indian Program (AIP) is a multidisciplinary, intercollege program consisting of academic, research, extension, publications and student support components.

Academic component. The AIP offers a range of courses that increase all interested students' awareness of the unique heritage of American Indians. Students are challenged by such topics as the sovereign rights of Indian nations and the contemporary relevance of Indian attitudes toward the environment. The program's instructional core consists of courses focusing on American Indian life with an emphasis on the Iroquois and other Indians of the Northeast. Core courses are supplemented by a variety of offerings from several departments. Other courses with substantial Indian content supplement these core courses.

The student support staff assist Native students in completing an enriched Cornell education by coordinating academic tutoring, financial aid, personal counseling, and other student services. Akwe:kon, the American Indian Program residence house, is one option available for students interested in a living environment that promotes multiculturalism.

Research. Research priorities include Indian education, social and economic development, agriculture, environmental issues and cultural preservation. This research, which has serious implications in Indian communities, will be of interest to non-Indian and Indian graduate students.

OUTREACH. The AIP's OUTREACH unit seeks to develop solutions to problems identified by Indian communities. In this way the AIP can facilitate the application of institutional expertise and resources to community needs.

Publications and public relations. AIP publishes its own multidisciplinary journal, *Akwe:kon Press*, and sponsors conferences, guest lectures, and forums on important local, national, and international Indian issues. AIP also contributes articles and information to the national Indian press.

COURSE OFFERINGS

For full descriptions of the following courses, consult the individual departmental listings.

The Indian Traditions

R SOC 100 American Indian Studies: An Introduction

R SOC 318 An Ethnohistory of the Haudenosaunee: The Six Nations Iroquois Confederacy

ANTHR 230 Cultures of Native North America @ #

ANTHR 242 American Indian Philosophies I: Power and World Views (also Rural Sociology 242)

ANTHR 354 The Peopling of America @#

CRP 360/666 Pre-industrial Cities and Towns of North America

Indians in Transition

ANTHR 318 Ethnohistory of the Iroquois

HIST 209 Political History of Indians in the United States #

HIST 219 Freshman Writing Seminar: History of North American Indians

HIST 276–277 Resistance and Adaptation: Native American Responses to the Conquest

HIST 381–382 Content and Form of Iroquois Diplomacy

R SOC 442 North American Indian Philosophies

HIST 429 American Indians in Eastern North America #

HIST 624 Graduate Seminar in American Indian History

Contemporary Issues

ANTHR 243 American Indian Philosophies II: Native Voices (also Rural Sociology 243)

ANTHR 354 The Peopling of America

ANTHR 356 The Archaeology of South America @ #

ANTHR 442 American Indian Philosophies: Selected Topics

ANTHR 663 Hunters, Gatherers, and the Origins of American Agriculture

ANTHR 665 Native American Contributions to Anthropological Thought

CRP 363/547 American Indian Planners and Public Policy

R SOC 175 North American Indians From 1890 to the Present

R SOC 440 Social Impact of Rapid Resource Development

Independent Study

Independent study courses in departments; students must have approval of an American Indian studies faculty member.

Center for Applied Mathematics

The Center for Applied Mathematics administers a broadly based interdepartmental graduate program that provides opportunities for study and research over a wide range of the mathematical sciences. This program is based on a solid foundation in analysis, algebra, and methods of applied mathematics. The remainder of the graduate student's program is designed by the student and his or her Special Committee. For detailed information on opportunities for graduate study in applied mathematics, students should contact the director of the Center for Applied Mathematics, 504 Engineering and Theory Center.

There is no special undergraduate degree program in applied mathematics. Undergraduate students interested in an application-oriented program in mathematics may select an appropriate program in the Department of Mathematics, the Department of Computer Science, or some department of the College of Engineering.

A listing of selected graduate courses in applied mathematics can be found in the description of the center on page 14.

Asian American Studies Program

The Asian American Studies Program is a university-wide program within the College of Arts and Sciences. Its aim is to promote teaching, research, and cultural activities related to Americans of Asian heritage. The program functions as a teaching and resource center to serve the educational needs of the general Cornell community as well as those of the Asian American community. It is intercollegiate in nature with links to all the schools and colleges of the university. The teaching program offers a number of broad basic courses dealing with the Asian American experience that are offered in any of the participating colleges, depending on content and faculty affiliation. It encourages the incorporation of more specific Asian American content into the mainstream curriculum of the university by providing financial resources and substantive support to faculty members interested in developing new courses and adding pertinent materials to existing courses. The Course Development Grants Program has been established for this purpose. The staff in the program will work toward establishing one or more academic concentrations in the future.

Research

The research program encourages and stimulates research on Asian American topics by functioning as a resource and activity center for its affiliated members as well as the general Cornell community. It sponsors activities designed to facilitate dialogue and interchange among faculty from a variety of

disciplines and strives to promote collaborative research among its members. To this end, the Research Grants Program has been instituted to provide seed money to faculty and students for research on Asian American topics.

Art and Culture

The third dimension of the program is to foster and promote Asian American culture and art. The program functions as a resource center and a place for social interaction among Asian American students and members of the Cornell community. In this capacity the program sponsors events aimed not simply at enhancing Asian American students' sense of identity but also at developing an appreciation for the creative aspects of the heritage of Asian Americans among all members of the Cornell community.

Affiliated Faculty

Gary Y. Okihiro, director; M. L. Barnett (Rural Sociology and Asian Studies), T. Chaloemtiarana (Southeast Asia Program), P. Chi (Consumer Economics and Housing), M. C. Chou (Asian Studies), J. W. Cody (City and Regional Planning), B. de Bary (Asian Studies), J. V. Koschmann (History), L. C. Lee (Human Development and Family Studies), D. R. McCann (Asian Studies), J. McRae (East Asian Religions), T. L. Mei (Asian Studies), V. Nee (Sociology) G. Okihiro, (History), R. E. Ripple (Education), N. Sakai (Asian Studies), P. S. Sangren (Anthropology), R. J. Smith (Anthropology), K. W. Taylor (Asian Studies), S. Wong (English), M. W. Young (History of Art)

Courses

AAS 110 Introduction to Asian American Studies
Spring. 3 credits.
T R 11:40–12:55. G. Okihiro.
Interdisciplinary, cross-cultural introduction to Asian American Studies focusing on contemporary issues. Major themes include: identity and stereotypes, gender, family, community, education, migration and labor, and anti-Asianism. Coverage will be given to both Hawaii and the U.S. mainland, and to Asian Indians, Chinese, Filipinos, Hawaiians, Japanese, Koreans, and Southeast Asians.

AAS 213 Asian American History (also History 213)
Fall. 4 credits.
T R 10:10–11:25. G. Okihiro.
Comparative introductory history of Asian Indians, Chinese, Filipinos, Japanese, and Koreans in the U.S. from 1850 to World War II. Themes include U.S. expansionism in the Pacific, Asian migrant labor in Hawaii and the American West, the anti-Asian movement, and Asian American resistance.

AAS 262 Asian American History (also English 262)
Spring. 3 credits.
T R 1:25–2:40. S. Wong.
This course will introduce students to the wide range of writings by Asian Americans and to some critical issues concerning the production and the reception of Asian American texts. In reading through selected works of prose, poetry, and drama, we will be asking questions about the historical formation of Asian American identities and the problem of defining an Asian American literary tradition.

[AAS 350 The Art and Politics of Defining the Self in Media Images (also Theatre Arts 350)
Spring. 3 credits. Not offered 1992–93.
The focus of this course is an exploration of the way films deal with the representation of people of poor within the American experience. Through the analysis of selected films and class discussions we will explore filmic representations of history, culture, class, gender, and identity.]

[AAS 385 Verse Writing (also English 385)
Not offered 1992–93.
This course will have two focii. One will be an unusual selection of traditional, modernist, and contemporary East Asian and American expansions of poetical "form" that students will use as models (or irritants) for their own experiments. Poets whose work we will look at include Matsuo Basho, C. K. Williams, classical Buddhist exegetes, Theresa Cha, and Yi Sang, among others. Secondly, as we explore these forms, we will reexamine some of our basic assumptions about what it means to write "contemporary" poetry. Those wishing to enroll in this class should bring a sample of poems to our *first* meeting.]

AAS 412 Undergraduate Seminar in Asian American History (also History 412)
Spring. 4 credits.
W 2:30–4:25. G. Okihiro.
A reading and research seminar that will cover various topics in Asian American history. The topic will be the idea of the "yellow peril" in European and American thought.

[AAS 435 Asian American Images in Film
3 credits. Prerequisite: AAS 110 or permission of instructor. Not offered 1992–93.
Staff.
Examination of images of Asians in American film and television productions within their historical and socio-cultural contexts. Use of film and media theory to assess the impact of those images on both Asian and non-Asian American viewers. Students will be challenged to create, in video or on paper, images that avoid stereotypes and depict more realistically the Asian American experience.]

[AAS 465 Identity and Personality (also HDFS 465)
Not offered 1992–93.
The seminar will review psychological theory and research dealing with Asian Americans. Topics such as family and kinship patterns, personality and identity issues, academic performance and achievement, immigration and adjustment, etc., will be examined within the context of the various Asian ethnic cultures and American society.]

AAS 478 Self and Nation in Asian-American Literature (also English 478)
Fall. 4 credits.
T R 2:55–4:10. S. Wong.
A study of the ways in which Asian American writers have constructed discourses of self and nation. Topics will include nationalism, feminism, identity politics, and theories of minority discourse. In our reading of selected works of prose, poetry and drama by Chinese American, Filipino American, Japanese American and Korean American writers, we will be asking questions about the relation of these works to the moment of their production and reception, and the manner in which these textual representations engage with shifting cultural and political struggles. Writers under discussion may include: Carlos Bulosan, Theresa Hak Kyung Cha, Frank Chin, Jessica Hagedorn, David Henry Hwang, Maxine Hong Kingston, Joy Kogawa, David Mura.

AAS 495 Independent Study
Fall or spring. 1–4 credits.
Topic and credit hours to be mutually arranged between faculty and student. Independent Study Forms must be approved by Asian American Studies Program Office.

[AAS 611 Asian Americans, Civil Rights, and the Law (also Law 610)
Next offered fall 1993.
Examination of major immigration and civil rights laws and Supreme Court cases that have affected Asian Americans. Topics include America's immigration policy, alien land laws, and Asian American community development; Japanese Americans and World War II and the redress and reparations movement; Asian women; Asian labor; voting rights and Asian American empowerment; anti-Asian violence and the criminal justice system; equal educational opportunity and affirmative action; and language rights and the "English only" initiatives. Comparative review of Asian Americans and other ethnic minorities within the American legal system.]

Biology and Society

A. G. Power, director of undergraduate studies, colleges of Arts and Sciences and Agriculture and Life Sciences; V. Utermohlen, advising coordinator, College of Human Ecology; R. Barker, D. Bates, B. Bedford, A. Boehm, R. Boyd, U. Bronfenbrenner, emeritus, S. M. Brown Jr., emeritus, P. Bruns, S. Ceci, B. Chabot, C. C. Chu, P. Dear, C. Eberhard, G. W. Feigenson, J. Ford, J. Fortune, C. Geisler, M. Gilliland, S. Gilman, C. Greene, D. Gurak, J. Haas, R. Howarth, H. C. Howland, S. Jasanoff, K. A. R. Kennedy, B. Knuth, A. Lemley, M. Lenzenweger, D. Levitsky, B. Lewenstein, B. A. Lewis, J. Fessenden MacDonald, K. S. March, L. Palmer, A. Parrot, D. Pimentel, T. Pinch, W. Provine, H. Ricciuti, emeritus, S. Robertson, R. Root, M. Rossiter, P. Schwartz, M. Small, N. Sturgeon, J. M. Stycos, P. Taylor, J. Ziegler

The biology and society major is ideally suited for students who wish to combine training in biology with exposure to perspectives from the social sciences and humanities on the social, political, and ethical aspects of modern biology. In addition to providing foundational training in basic biology, biology and society students obtain background in the social dimensions of modern biology and in the biological dimensions of contemporary social issues.

The biology and society major is offered to students enrolled in the College of Arts and Sciences and the College of Human Ecology. Undergraduates in the College of Agriculture and Life Sciences can develop an approved sequence of courses from the biology and society curriculum under general studies. The major is coordinated for students in all colleges through the biology and society office. Students can get information, specific course requirements, and application procedures for the major from the office in 275 Clark Hall, 255–6042.

Because the major is multidisciplinary, students must attain a basic understanding of the several disciplines it comprises. The curriculum includes courses in ethics; mathematics; statistics; history, philosophy, and social studies of science and biology; and basic biology (e.g., genetics and development; biochemistry and molecular-cell biology; ecology; evolutionary biology) as well as integrative courses offered through Biology and Society. In addition, majors are required to take a core course and must develop a theme: a coherent and meaningful grouping of courses representative of their special interest in biology and society. Students should develop the theme and select the courses in consultation with a member of the biology and society faculty. Courses must be above the 100 level, at least 3 credits, and taken for a letter grade if used to fulfill a major requirement.

There are student advisers and faculty available (according to posted office hours or by appointment) in the biology and society office, 275 Clark Hall or 278 Clark Hall (advising office), to answer questions and to provide assistance.

Admission to the Major

All students should have completed a year of college-level biology and submit an application during their sophomore year. Juniors are considered on a case-by-case basis. Upper-division applicants should realize the difficulties of completing the major requirements in fewer than two years. The application includes (1) a one-page statement explaining the student's intellectual interests in the biology and society major and why the major is consistent with the student's academic goals and interests; (2) the theme the student wishes to pursue in the major; (3) a tentative plan of courses fulfilling biology and society requirements, including courses taken and those the student plans to take; and (4) a transcript of work taken at Cornell University and elsewhere if applicable, current as of the date of application.

Acceptance into the major requires completion of the course sequence in introductory biology. Sophomores in the process of completing this prerequisite may be admitted to the major on a *provisional* basis. It is the student's responsibility to assure that final acceptance is granted on satisfactory completion of the introductory biology sequence. Although only introductory biological science is a prerequisite for acceptance, students will find it useful to have completed some of the other requirements (listed below) by the end of their sophomore year, preferably in the first semester. Human Ecology students should also consult the current Human Ecology Guide and meet with the college advising coordinator, Virginia Utermohlen, N206a Martha Van Rensselaer Hall, 255-2136.

During the 1990–91 academic year, the Biology and Society Educational Policy Committee restructured the requirements for the major. Listed below is the newly adopted set of course requirements for biology and society majors. Students in the classes of 1993 through 1995 are permitted to select either the curriculum that follows or that which was in place at the time of their admittance. Applicants to the major during and after fall 1991 however, are strongly encouraged to adopt the new set of requirements below and will be required to declare their option at the time of application. Current students will be enrolled under the new requirements unless the Biology and Society major is notified (in writing) to the contrary. All students in the Class of 1996 and after must elect the new curriculum that follows.

Major Requirements – New Curriculum

1) **Basic courses**

   A. Biological sciences 101–104 or 105–106 or 107–108 (prerequisite for admission to Biology and Society)

   B. College calculus (one course):* Math 106, 111, 112 or any higher level calculus

      Recommended but not required: General chemistry (one year sequence) (prerequisite to biochemistry and other chemistry courses): Chemistry 103–104, 207–208, or 215–216

2) **Foundation Courses** (should be completed by end of junior year)

   A. Ethics: One course; Bio&Soc 205 (also BioSci 205 and Phil 245) or Bio&Soc 206 (also BioSci 206 and Philosophy 246)

   B. Social sciences/humanities foundation: Two courses; one from any two of the following subject areas: History of Biology/History of Science; Philosophy of Science; Sociology of Science; Politics of Science; and Science Communication**

   C. Biology foundation (Breadth requirement): Three courses; one from three of the following subject areas: Ecology (BioSci 261); Evolutionary Biology (BioSci 378); Biochemistry, Molecular and Cell Biology (BioSci 231 or 330 or 331); Microbiology (BioSci 290); Genetics and Development (BioSci 281 or 282 or Plant Breeding 225); Neurobiology and Behavior (BioSci 221 or 222); Botany (BioSci 241); and Physiology and Anatomy (BioSci 311)

   D. Biology foundation (Depth requirement): One biology course for which one of the above (2.C.) is a prerequisite

   E. Statistics: One course selected from Stat 200, ILR 210, Stat 215, Agr Ec 310, Ed 353, Soc 301, Psych 350, Math 372, Econ 319, OR&IE 370, Stat 601, CRP 320, or B&Soc 202

3) **Core Course: (one course).** Should be completed by end of junior year.

   B&Soc 301 Biology and Society: The Social Construction of Life (also Bio Sci 301/S&TS 401); or Phil 286: Science and Human Nature (also S&TS 286)

4) **Theme** (five courses that correspond to the theme selected by the student). These courses must be above the 100-level, at least 3 credit hours and taken for a letter grade)

   A. Natural sciences issues (One course)

   B. Biology elective (One course, with significant biology content, from Bio. Sci., Nutr. Sci., Agr. Sci., HDFS, Psych., Agron., An. Sci., Ento., Food Sci., Microbiol., Nat. Res., Plant Breeding, Plant Patho. or Vet. Med.)

   C. Humanities/social sciences electives** (Two courses. Courses from the list of Senior Seminars may be used as theme electives if not used to meet another requirement).

   D. **Senior Seminar** (One course taken senior year). Courses change yearly.

* Students may petition to take a second statistics course (an advanced course, in sequence with the statistics course taken in the foundation) in place of the calculus requirement.

** Among the courses taken to meet the social sciences and humanities requirements (2.A, 2.B, 3, and 4.C), a minimum of two social science courses and two humanities courses must be chosen. History of biology/history of science and philosophy of science courses may be counted toward the humanities requirement for the major.

Themes in the Major

Biology and society students must elect a particular specialization within the major and select their courses accordingly. There are currently six recommended themes in the biology and society major: biology, behavior, and society; biology and human population; biology and public policy; environment and society; food, agriculture, and society; and health and society. Students may also develop their own themes (which in recent years have included topics such as biotechnology and society, and agriculture, environment, and society) in consultation with their faculty adviser. Students are expected to select courses taken to meet the foundation, core, and theme requirements so as to build a coherent theme. Sample curricula for the recommended themes and for several student-developed themes are available in the biology and society office.

Independent Study

Projects under the direction of a biology and society faculty member are encouraged as part of the program of study in the student's theme area. Applications for research projects are accepted by individual faculty members. Students may enroll for 1–4 credits in Biology and Society 375 (Independent Study) with written permission of the faculty supervisor and may elect either the letter grade or the S-U option. Biology and Society majors from the colleges of Arts and Sciences and Agriculture and Life Sciences may elect to do an independent study project as an alternative to, or in advance of, an honors project. Applications and information on faculty research, scholarly activities, and undergraduate opportunities are available in the biology and society office, 275 Clark Hall. Independent study credits may not be used in completion of the major requirements.

Honors Program

The honors program is available to biology and society majors from the colleges of Arts and Sciences and Agriculture and Life Sciences and is designed to challenge the academically-talented undergraduate student. Students who enroll in the honors program are given the opportunity to do independent study and to

develop the ability to evaluate research dealing with issues in biology and society. Students participating in the program should find the experience intellectually stimulating and rewarding.

Selection of Students: During the first three weeks of the fall semester, senior biology and society majors are considered for entry into the honors program by the Honors Program Committee. Applications for the honors program are available at the biology and society office, 275 Clark Hall. To qualify for the honors program, students must explain how the honors work will fit into their overall program, must have an overall Cornell cumulative grade-point average of at least 3.00, and must have at least a 3.30 cumulative grade-point average in all courses used to meet the major requirements. Students in the College of Agriculture and Life Sciences must also meet the requirements of that college and be selected by one of the existing college honors committees.

If, after admission to the honors program, a student fails to maintain a high scholastic average, or if for any other reason(s) he or she is considered unsuited for honors work, the student reverts to candidacy for the regular bachelor's degree. The student who does not continue in the honors program receives credit for any work passed in the program but is not eligible for a degree with honors.

Project Requirements: The satisfactory completion of a special project and the writing and oral defense of an honors thesis are required. The project must include substantial research, and the completed work should be of wider scope and higher quality than the work normally required for an advanced course.

Initiative for formulation of ideas, developing the proposal, carrying out the study, and preparation of a suitable thesis lies with the student. Honors projects will be under the direction of two advisers. Candidates must first find a biology and society faculty member willing to serve as the adviser and, together with the adviser, find a second adviser among the faculty at large. The purpose of the second adviser is to guarantee expertise in the subject matter covered by the thesis. Students in the College of Agriculture and Life Sciences must select this adviser from the area in which their thesis will be reviewed.

Students must enroll in Biology and Society 499 for one or both terms of their senior year after consultation with the biology and society thesis adviser. They take from 3 to 5 credits per term with up to a maximum of 8 credits in Biology and Society 499. Students are encouraged to enroll for both terms to give them time to develop a project properly for the thesis. If registering for a two-semester honors project, students must register for the total credits desired for the whole project each term (e.g., 8 credits for the fall term and 8 credits for the spring term). Students should note, however, that Biology and Society 499, because it is a special honors course, is to be taken in addition to those courses that meet the regular major requirements. Honors projects cannot be used to fulfill the senior seminar requirement.

Honors Thesis: Students and their advisers should meet regularly during the period of research and writing for the honors thesis. The responsibility for scheduling these meetings, and for carrying out the research agreed on, rests with the student. Advisers are expected to make themselves available for discussion at the scheduled times and to offer advice on the plan of research, as well as provide critical and constructive comments on the written work as it is completed. They are not expected, however, to have to pursue students either to arrange meetings or to ensure that the research and writing are being done on schedule.

There is no prescribed length for a thesis, as different topics may require longer or shorter treatment, but normally it should be no longer than seventy double-spaced, typed pages. The thesis must be completed in a form satisfactory for purposes of evaluation and submitted to the two thesis advisers and one member of the Biology and Society faculty appointed by the Biology and Society chair by April 15. The candidate must meet with the three reviewers to formally defend the thesis by April 23.

Evaluation and Recommendation: Two copies of the completed and defended thesis (suitably bound in a plastic or hard-backed cover), together with the advisers' recommendations, must be submitted to the Honors Program Committee by May 10.

Following the formal defense of the thesis, the thesis advisers will each submit to the Honors Program Committee a recommendation that includes (1) an evaluation of the honors work and the thesis, (2) an evaluation of the student's academic record in the biology and society major, and (3) a recommendation for or against awarding honors. (For College of Arts and Sciences students, a recommendation for the level of honors must be included.)

Copies of the thesis and recommendations will be circulated to the Honors Program Committee. As the committee may have little knowledge of the subject area of the thesis, letters of recommendation should be carefully prepared to help the committee ensure consistency in the honors program. Unless there is serious disagreement, the recommendation of the advisers should stand. If there is disagreement, the Honors Program Committee will make the decision after consultation with the interested parties.

I. Freshman Writing Seminars

[B&SOC 103 In the Company of Animals
Spring. 3 credits. Not offered 1992–93.
A. Boehm.]

B&SOC 104 Ecosystems and Ego Systems
Spring. 3 credits.
M. Gilliland.

B&SOC 108 Living on the Land
Fall. 3 credits.
A. Boehm.

[B&SOC 109 Women and Nature (also English 105.4)
Fall. 3 credits. Not offered 1992–93.]

[B&SOC 113 Writing as a Naturalist (also English 113)
Fall and spring. 3 credits. Not offered 1992–93.]

B&SOC 114 Ecology and Social Change (also Science and Technology Studies 114) (pending EPC approval)
Spring. 3 credits.
P. Taylor.

[B&SOC 115 The American Way: Addiction and Consumption
Spring. 3 credits. Not offered 1992–93.
M. Gilliland.]

B&SOC 167 Science In and Out of the Lab (also Science and Technology Studies 167)
Fall. 3 credits.
S. Allison.
For up-to-date information consult the John S. Knight Writing Program brochure.

II. Foundation Courses

A. Ethics (select one)

B&SOC 205 Ethics and Health Care (also Philosophy 245 and Biological Sciences 205)
Fall. 4 credits. Limited to 70 students. Registered students not attending the first week will be dropped from the course. Open to sophomores, juniors, and seniors; permission of instructor required for graduate students.
Lecs, T R 8:40–9:55, disc, 1 hour each week to be arranged. D. Allchin.
Critical philosophical analysis of the conceptual frameworks in which ethical problems associated with health care can be formulated and solutions evaluated. General topics (with sample issues in parentheses) include knowledge in ethics (ethical skepticism, ethical relativism); proper social allocation of resources for, and within, medicine (entitlement to health care, access to scarce medical resources, cost-benefit analysis); the proper account of basic concepts such as illness, death, autonomy, and personhood (abortion, euthanasia, procreative technologies); and the professional-patient relationship (informed consent, confidentiality, medical paternalism). *Note:* A more detailed description of this course is available in the biology and society office, 275 Clark Hall.

B&SOC 206 Ethics and the Environment (also Philosophy 246 and Biological Sciences 206)
Spring. 4 credits. Open to all undergraduates; permission of instructor required for graduate students.
Lecs, T R 11:40–12:55, disc, 1 hour each week to be arranged. D. Allchin.
Critical philosophical analysis of the conceptual frameworks in which policies affecting the environment are formulated and judged. An introductory section of the course discusses the nature of ethics and the possibility of knowledge in ethics. The first major substantive component of the course deals with the nature and extent of individual and social obligations to spatially distant people, future generations, nonhuman animals, and nonsentient things (e.g., the ecosystem). The second major component of the course deals with the appropriate analysis of the origin of environmental problems and the range of options for their solution. Topics include individual vs. collective goods, cost benefit analysis, and coordination problems. *Note:* A more detailed description of this course is available in the biology and society office, 275 Clark Hall.

B. Social Sciences/Humanities Foundation (2 courses, 1 from any 2 areas)

1. History of Biology and History of Science

B&SOC 288 History of Biology (also Biological Sciences 202, History 288, and Science and Technology Studies 288)
Spring. 3 credits. Prerequisite: one year of introductory biology. S-U grade optional.
Lecs, T R 10:10–11:25. W. B. Provine.
An examination of the history of biology, emphasizing the interaction of biology and culture. Original writings of biologists constitute the bulk of reading assignments. This course covers the period from classical antiquity to the present, but primary emphasis is on twentieth-century biology.

B&SOC 322 Medicine and Civilization (also German Studies 322)
Fall. 3 credits. Offered alternate years.
Lecs M 12:20–2:15. S. Gilman.
What is sickness? What is health? Who is the physician? Is a physical illness different from mental illness? Where is medicine practiced? Is being a patient or a doctor different from culture to culture and from age to age? This course will introduce the undergraduate student to the historical and cultural context of medicine. Our sources will range from the texts of ancient Greek medicine to contemporary films and novels dealing with medicine. We will examine the historical and social context of mental illness as well as physical illness from the standpoint of patient, physician, and "society." All of the primary readings are available in English.

HIST 233 Agriculture, History, and Society: From Squanto to Biotechnology (also Science and Technology Studies 233)
Fall. 4 credits.
M W 12:20–1:10, plus discussion.
M. Rossiter.

[HIST 282 Science in Western Civilization (also Science and Technology Studies 282)
Spring. 4 credits. Not offered 1992–93; next offered spring 1994.
P. Dear.]

BIO S 207 Evolution (also Science and Technology Studies 287 and History 287)
Fall. 3 credits. (May not be taken for credit after Biological Sciences 378, Evolutionary Biology.)
W. B. Provine.

HIST 433 Comparative History of Science (also Science and Technology Studies 433) #
Spring. 4 credits.
M. Rossiter.

HIST 444 Historical Issues of Gender and Science (also Women's Studies 444 and Science and Technology Studies 444)
Spring. 4 credits.
M. Rossiter.

2. Philosophy of Science

PHIL 286 Science and Human Nature (also Science and Technology Studies 286)
Spring. 4 credits. May be used to meet the philosophy of science requirement *if not* used to meet the core course requirement.
R. Boyd and N. Sturgeon.

PHIL 381 Philosophy of Science: Knowledge and Objectivity (also Science and Technology Studies 381)
Fall. 4 credits. Limited to 37 students.
R. Boyd.

[PHIL 382 Philosophy and Psychology
4 credits. Not offered 1992–93.]

[PHIL 389 Philosophy of Science: Evidence and Explanation (also Science and Technology Studies 389)
Spring. 4 credits. Not offered 1992–93.
R. Miller.]

3. Sociology of Science

B&SOC 301 Biology and Society: The Social Construction of Life (also Biological Science 301 and Science and Technology Studies 401)
Fall. 4 credits. Prerequisite: one year of introductory biology. Limited to 75 students. May be used to meet the sociology of science requirement if not used to meet the core course requirement.
Sem and disc, M W 2:30–4:25. P. Taylor.

B&SOC 342 Sociology of Science (also Science and Technology Studies 442 and City and Regional Planning 442)
Fall. 4 credits.
T R 10:10–11:25. T. Pinch.
A view of science less as an autonomous activity than as a social institution. We will discuss such issues as controversies in science, textual analysis, gender, and the social shaping of scientific knowledge.

4. Politics of Science

B&SOC 406 Biotechnology and Law (also Science and Technology Studies 406)
Fall. 4 credits. Limited to 16 students. Recommended: a course in genetics or rDNA, a course in American government or law, or permission of instructor. Fee for course reading materials.
T 2:30–4:30. S. Jasanoff.
Biotechnology, with its myriad applications in areas such as medicine and agriculture, is developing more rapidly than the social institutions that are capable of controlling it. This course explores the use and potential abuse of biotechnology in areas such as genetic screening and counseling, reproductive technologies, intentional release of genetically engineered organisms, patents, and ownership of human tissue. Particular attention will be given to evolving legal and management strategies for regulating the applications of biotechnology. Readings are from science, medicine, law, and public policy. A research paper is required.

B&SOC 407 Law, Science, and Public Values (also Government 407 and Science and Technology Studies 407)
Fall. 4 credits.
Lec, M W F 1:25–2:15. S. Jasanoff.
This course explores the varied interactions between science and the legal process that have developed in recent years as a result of attempts to bring greater public accountability to the use of science and technology. It examines the activities of both legislatures and courts in controlling science and analyzes the values underlying these initiatives. Three major types of science-law interactions form the focus of the course: regulation of new technologies, judicial review of risk-management decisions, and legal control of professional standards in science and technology. Specific topics include the regulation of toxic chemicals and nuclear power, controversies about biotechnology, reproductive technologies and biomedical research, and scientific misconduct.

S&TS 415 The Politics of Technical Decisions (also City and Regional Planning 541 and Government 628)
Fall. 4 credits.
M. Dennis.

5. Science Communication

[B&SOC 300 Investigative Research on the Social Impact of Science (also Textiles and Apparel 301 and Science and Technology Studies 402)
Spring. 4 credits. Prerequisite: one year of science and prior consultation with instructors. Not offered 1992–93.
P. Taylor and P. Schwartz.
Students choose a current issue in the social impact of biological or physical sciences and work through the steps of investigation from issue definition to spoken presentations and proposals for action. In a workshop setting, students comment on and learn from other's projects and discuss case studies and articles, with occasional guest speakers and films.]

COMM 352 Science Writing for the Mass Media (also Science and Technology Studies 352)
Fall. 3 credits. Not open to freshmen. Limited to 25 students. Prerequisite: one college writing course.
B. Lewenstein.

COMM 360 Scientific Writing for Public Information
Fall or spring. 3 credits. Limited to 25 nonfreshman or graduate students per section. Prerequisite: any college-level writing course.

*C. **Biology foundation*** (Breadth Requirement): Three courses: one from three of the following subject areas:

1. Biochemistry, Molecular and Cell Biology

BIO S 231 General Biochemistry
Fall. 3 credits.
J. M. Griffiths.

BIO S 330 Principles of Biochemistry, Individual Instruction
Fall or spring. 4 credits.
M. Ferger.

BIO S 331 Principles of Biochemistry, Lectures
Fall. 4 credits. (2 credits if taken after Biological Sciences 231)
G. Feigenson, R. Barker and B. K. Tye.

2. Ecology

BIO S 261 Ecology and the Environment
Fall. 4 credits.
T. E. Dawson and R. Root.

3. Genetics and Development

BIO S 281 Genetics
Fall, spring, or summer. 5 credits.
R. S. MacIntyre, T. Fox and M. L. Goldberg.

BIO S 282 Human Genetics
Spring. 3 credits. (2 credits if taken after Biological Sciences 281)
R. Calvo.

[PL BR 225 Plant Genetics
Spring. 4 credits. Offered alternate years. Next offered spring 1994.
M. A. Mutschler.]

4. Evolutionary Biology

BIO S 378 Evolutionary Biology
Spring. 4 credits.
R. G. Harrison.

5. Microbiology

BIO S 290 General Microbiology Lectures
Fall, spring, or summer. 3 credits. Prerequisties: Biological Sciences 101–102 and 103–104 and Chemistry 104 or 208, or equivalent. Recommended: concurrent registration in Biological Sciences 291.
M. Cordts.

6. Neurobiology and Behavior

BIO S 221 Neurobiology and Behavior I: Introduction to Behavior
Fall. 3 or 4 credits (4 credits with discussion and written projects). Not open to freshmen. Limited to 20 students.
C. Walcott and staff.

BIO S 222 Neurobiology and Behavior II: Introduction to Neurobiology
Spring. 3 or 4 credits. (4 credits with discussion and written projects). Not open to freshmen. Limited to 20 students.
O. P. Hamill and staff.

7. Botany

BIO S 241 Introductory Botany
Fall. 3 credits. Prerequisite: one year of introductory biology or permission of instructor.
D. Paolillo and W. Crepet.

8. Physiology and Anatomy

BIO S 311 Introductory Animal Physiology, Lectures (also Veterinary Medicine 346)
Fall. 3 credits. Prerequisite: one year of college biology, chemistry, and mathematics. Recommended: previous or concurrent course in physics.
E. R. Loew and staff.

D. Biology foundation (depth requirement): One course for which one of the above breadth requirement courses (2C) is a prerequisite.

E. Statistics *(select one)*

[B&SOC 202 Statistical Analysis for the Life Sciences
Summer. 4 credits. Limited to 20 students. Fee for course materials. Next offered summer 1993.
P. Taylor.
Statistical analysis includes the construction of observations (in experiments and in the field), summarizing data (statistics, distributions, correlation), testing hypotheses and other statistical inference (including "goodness of fit"). Concepts and methods will be introduced through lectures, practice classes and discussions. Real cases from the life sciences will be used, and the different interpretations, hidden assumptions, limitations and misuse of statistically derived results will be emphasized.]

AG EC 310 Introductory Statistics
Fall and spring. 4 credits.
C. van Es.

CRP 320 Introduction to Statistical Reasoning for Urban and Regional Analysis
Fall. 3 credits.
Staff.

ECON 319 Introduction to Statistics and Probability
Fall. 4 credits.
Staff.

EDUC 353 Introduction to Educational Statistics
Spring. 3 credits. Prerequisite: Education 352 (1 credit) or concurrent registration.
J. Millman.

ILR 210 Statistics: Statistical Reasoning
Fall and spring. 4 credits.
Staff.

MATH 372 Elementary Statistics
Fall. 4 credits.
Staff.

OR&IE 370
Fall or spring. 4 credits.
L. Weiss.

PSYCH 350 Statistics and Research Design
Fall. 4 credits.
T. Gilovich.

SOC 301 Evaluating Statistical Evidence
Fall. 4 credits.
R. Breiger.

STATS 200 Statistics and the World We Live In
Spring. 3 credits.
N. Altman.

STATS 215 Introduction to Statistical Methods
Fall. 3 credits.
C. E. McCulloch.

STATS 601 Statistical Methods I
Fall. 4 credits.
G. Churchill.

III. Core Courses

B&SOC 301 Biology and Society: The Social Construction of Life (also Biological Sciences 301 and Science and Technology Studies 401)
Fall. 4 credits. Prerequisite: one year of introductory biology. Students taking 301 as a core course must take a humanities course as part of their theme requirement. Limited to 75 students.
Sem and disc, M W 2:30–4:25. P. Taylor.
Controversial issues, past and present, in the life sciences and tools for analysis of the social, historical, and conceptual underpinnings of these issues. Topics include evolution and natural selection, heredity and genetic determinism, biotechnology and reproductive interventions, ecology and environmental change. Analytic themes include bias, metaphor, historical semantics, styles of explanation, determinism, causality, interest, social construction, and gender. Through discussions and writing assignments, students will develop analytic skills and their own responses to current issues.

PHIL 286 Science and Human Nature (also Science and Technology Studies 286)
Spring. 4 credits.
Lecs, M W F 11:15, disc, to be announced.
R. Boyd and N. Sturgeon.
An examination of attempts in the biological and social sciences to offer scientific theories of human nature and human potential and to apply such theories to explain important social and psychological phenomena. Topics vary, and may include issues in psychology, such as behaviorism, Freudianism, and artificial intelligence, or issues in the foundations of historical theory, such as methodological individualism and economic determinism, as well as relevant issues in the biological sciences. Topics for 1993: Darwin, Social Darwinism, and Sociobiology.

IV. Themes

A. Issues - Natural Sciences (one course)

B&SOC 201 Biotechnology: The 'New' Biology (also Biological Sciences 201)
Spring. 3 credits. Prerequisite: one year of introductory biology or equivalent. Not for students who have taken or are currently enrolled in BioSci 281, 330, or 331. S-U optional.
Lecs, T R 2:30, disc, T R 3:35. Students need to have *both* days free for special sessions. Discussion group assignments made during first week. J. Fessenden MacDonald et al.
The topics of spring 1993 will be Genetic Screening, Immunology and AIDS, Reproductive Biotechnology, and Genetically Engineered Plants in Agriculture.

A general introduction to the application of modern molecular biology and cell culture techniques to the manipulation of genetic engineering of animals, plants, and microorganisms. Information on recombinant DNA technology, monoclonal antibodies, plant and/or animal cell culture, and embryo manipulation methods will be presented. Commercial applications to health, forensics, environment, agriculture, and food as well as the economic, social policy, regulatory, ethical, and legal issues that surround biotechnology will be discussed. The course will be taught in four modules; and the topics will vary from year to year.

B&SOC 214 Biological Basis of Sex Differences (also Biological Sciences 214 and Women's Studies 214)
Fall. 3 credits. Prerequisite: one year of introductory biology. Limited to non-biology majors and freshman and sophomore biology majors. S-U grades optional. Offered alternate years.
Lecs, T R 8:30–9:55; occasional alternate discs to be arranged. J. E. Fortune.
The structural and functional differences between the sexes are examined. Emphasis is placed on mechanisms of mammalian reproduction; where possible, special attention is given to studies of humans. Current evidence on the effects of gender on nonreproductive aspects of life (behavior, mental, and physical capabilities) is discussed. The course is intended to provide students with a basic knowledge of reproductive endocrinology and with a basis for objective evaluation of sex differences in relation to contemporary life.

B&SOC 232 Recombinant DNA Technology and Its Applications (also Biological Sciences 232)
Spring. 3 credits. Limited to first-year students with Biology AP 4 or 5.
Lecs and discs, M W F 11:15. J. Calvo.

An introduction to molecular approaches to biology. Basic concepts underlying recombinant DNA technology together with strategies for cloning genes are discussed. Much of the course deals with applications of recombinant DNA technology to basic research and to biotechnology. Applications to be discussed include screening for genetic diseases, animal and plant improvement, and production of insulin, interferon, blood-clotting factors, growth hormones, vaccines, and feedstock chemicals. Scientific, historical, regulatory, social, and ethical issues are presented and discussed. Recommended especially for students desiring a firm background in recombinant DNA technology in preparation for taking genetics and biochemistry.

B&SOC 347 Human Growth and Development: Biological and Social Psychological Considerations (also Human Development and Family Studies 347 and Nutritional Sciences 347)
Spring. 3 credits. Prerequisites: Biological Sciences 101 or 109 or equivalent, and Human Development and Family Studies 115 or Psychology 101. Offered alternate years.
Lecs M W F 1:25–2:15. J. Haas and S. Robertson.
A review of major patterns of physical growth from the fetal period through adolescence, with consideration of biological and socio-environmental determinants of growth as well as physical and psychological consequences of variations in growth patterns. An examination of normal patterns of growth is followed by an analysis of major sources of variations in growth (normal and atypical).

ASTRO 201 Our Home in the Solar System
Spring. 3 credits.
C. Sagan.

BIO S 246 Plants and Civilization
Spring. 3 credits.
D. Bates.

[BIO S 275 Human Biology and Evolution (also Anthropology 275 and Nutritional Sciences 275)
Fall. 3 credits. Next offered fall 1993.
J. Haas and K. A. R. Kennedy.]

NTRES 201 Environmental Conservation
Spring. 3 credits.
T. Fahey.

[NS 222 Maternal and Child Nutrition
Spring. 3 credits. Not offered 1992–93.
V. Uthermohlen.]

NS 361 Biology of Normal and Abnormal Behavior (also Psychology 361)
Fall. 3 credits.
B. Strupp.

NS 650 Public Health Nutrition
Spring. 3 credits.
D. Roe.

HDFS 370 Abnormal Development and Psychopathology
Spring. 3 credits.
M. Lenzenweger.

*B. **Biology elective*** (One course with significant biology content from BioSci., Nutr. Sci., Agr. Sci., HDFS, Psych., Agron., An.Sci., Ento., Food Sci., Microbiol., Nat. Res., Plant Breeding, Plant Patho. or Vet. Med.)

*C. **Humanities/Social Science elective*** (two courses)

Courses listed earlier as Social Science/Humanities foundation courses (2.B.) are particularly appropriate as Social Science/Humanities electives. However a single course cannot be used to meet both requirements. Additional courses that are recommended as Social Science of Humanities electives are:

Recommended Social Science electives

BIO S 673 Human Evolution: Concepts, History, and Theory (also Anthropology 673)
Fall. 3 credits. Offered alternate years.
K. A. R. Kennedy.

CRP 480 Environmental Politics
Spring. 4 credits.
R. Booth.

CRP 451/551 Environmental Law
Fall. 4 credits.
R. Booth.

[CRP 656 Land Resources Protection Law
Fall. 3 credits. Not offered 1992–93.
R. Booth.]

HDFS 258 The Historical Development of Women as Professionals, 1800 to the Present (also Women's Studies 238 and History 238)
Fall. 3 credits.
J. Brumberg.

HSS 315 Human Sexuality
Spring. 3 credits.
A. Parrot.

[HSS 325 Health Care Services and the Consumer
Fall. 3 credits. Not offered 1992–93.
A. Parrot.]

[HSS 330 Ecology and Epidemiology of Health
Spring. 3 credits. Offered alternate years. Next offered spring 1994.
J. Ford.]

HSS 634 Health Care Organization—Providers and Reimbursement
Fall. 3 credits.
J. Kuder.

HSS 688 Alternative Health and Social Services Delivery Systems: Long-Term Care and the Aged
Spring. 3 credits.
R. Battistella.

NTRES 400 International Environmental Issues
Fall. 4 credits.
R. McNeil.

NS 245 Social Science Perspectives on Human Nutrition
Fall. 3 credits.
J. Sobal and D. Sanjur.

NS 457 National and International Food Economics (also Economics 374)
Spring. 3 credits.
E. Thorbecke.

PSYCH 255 Psychology and Medicine
Fall. 3 credits. Prerequisite: an introductory psychology course. Limited to 60 students.
H. Levin.

[PSYCH 326 Evolution of Human Behavior
Fall. 4 credits. Next offered fall 1993.
R. Johnston.]

R SOC 201 Population Dynamics (also Sociology 205)
Spring. 3 credits.
J. M. Stycos.

R SOC 205 Rural Sociology and International Development
Spring. 3 credits.
P. McMichael.

R SOC 324 Environment and Society (also Science and Technology Studies 324)
Fall. 3 credits.
Staff.

[R SOC 490 Society and Survival
Fall. 3 credits. Not offered 1992–93.
D. Gurak.]

Recommended Humanities electives

[GERST 347 Reading Freud: Race, Gender, and Psychoanalysis (also Psychology 389)
Spring. 3 credits. Offered alternate years. Next offered 1993–94.
S. Gilman.]

NTRES 407 Religion, Ethics, and the Environment
Spring. 3 credits.
R. Baer.

PHIL 241 Ethics (by petition for breadth requirement)
Fall. 4 credits.
T. H. Irwin.

PHIL 368 Global Climate and Global Justice (also Government 468)
Fall. 4 credits.
H. Shue.

V. Senior Seminars

[B&SOC 401 The History of Biology (also History 447 and Science and Technology Studies 447)
Fall. 4 credits. Limited to 20 students. A Common Learning course. Not offered 1992–93.
W. Provine.]

[B&SOC 402 The History of Biology (also History 448 and Science and Technology Studies 448)
Spring. 4 credits. Not offered 1992–93.
W. Provine.]

[B&SOC 404 Human Fertility in Developing Nations (also Rural Sociology 408)
Spring. 3 credits. Prerequisite: a population course or permission of instructor. Offered alternate years. Next offered spring 1994.
J. M. Stycos.
A review of the major literature dealing with the social causation of variation in human fertility. Emphasis will be on international comparisons and on the methodology of field research.]

B&SOC 406 Biotechnology and Law (also Science and Technology Studies 406)
Fall. 4 credits. Limited to 16 students. Recommended: a course in genetics or DNA, a course in American government or law, or permission of instructor. Fee for course reading materials.
T 2:30–4:25. S. Jasanoff.

B&SOC 414 Population Policies (also Rural Sociology 418)
Spring. 3 credits. Prerequisite: a population course or permission of instructor. Offered alternate years.
J. M. Stycos.
The ways in which societies try to affect demographic trends. Special focus is on government policies and programs to influence fertility.

B&SOC 426 Medicine and the Law
Fall. 4 credits. Letter grades only.
Lecs, T 2:30–4:25. Limited to 16 students.
W. Tarlow.
The role of law in modern medicine (and the related biomedical sciences) will be examined from the perspective of the social functions of law and medicine. A number of policy and ethical issues will be considered, including the role of hospitals and other health organizations in doctor-patient interactions, the social aspects of physician-patient interactions, reproductive technologies, the effect of medical malpractice on health-care delivery, legal issues in the care of the newborn, and health-care decisions for incompetents and terminally ill patients.

B&SOC 428 Medical Service Issues in Health Administration (also Human Service Studies 628)
Spring. 3 credits. Only Biology and Society majors can receive Arts credits for this course.
V. Utermohlen.
A survey of the issues that affect interactions between the health-care consumer and the health-care team, including disease processes (how disease occurs and progresses), the health-care team and illness, third-party payment and illness, and resource allocation.

[B&SOC 434 Biotechnology: Science, Policy and Values (also Biological Sciences 434)
Spring. 3 credits. Fee for course materials. Limited to 16 seniors and graduate students. Prerequisite: a course dealing with the science behind biotechnology or BioSci 281 or 330/331 or permission of instructor. Not offered 1992–93.
J. Fessenden MacDonald.
Issues raised by the introduction of new biotechnology products and procedures to medicine, food and agriculture, environment, and the legal system will be analyzed. There will be an examination of the scientific, political, legal, economic, social, and ethical implications. Cases studied will vary each term. Readings from various disciplines, including scientific papers, government reports, and industrial and legal reports, will provide background for class discussions. A research paper and oral presentations are required. Topic for 1994: environment, agriculture, and food biotechnology. Topics for 1995: rDNA drugs and diagnostics, genetic screening and DNA fingerprinting, and gene therapy.]

B&SOC 451 AIDS and Society
Fall. 3 credits. Limited to 20 students who have been approved by course coordinators. A Common Learning course.
W 2:30–4:30. S. Dittman and V. Utermohlen.
Discussions of the effect of HIV infection and AIDS on society will consist of seminars on the biology of the virus, medical treatment, transmission and prevention, and personal, social, and political impact of HIV/AIDS. Students will have the opportunity to initiate and carry out AIDS education projects on campus.

B&SOC 460 Social Analysis of Ecological Change (also Rural Sociology 660 and Science and Technology Studies 660)
Spring. 4 credits. Prerequisite: one year of science. Limited to 20 graduate students and seniors with permission of instructor.
Sem, M 7:00–10:20 p.m. P. Taylor.
Scientific studies of ecological and social processes, together with the analysis of those studies and their interpretation by historians, sociologists, and anthropologists. Topics include cybernetics, systems ecology, the tragedy of the commons, the *Limits to Growth*, ecological degradation, political ecology, global models, conservation biology, and climate change.

B&SOC 461 Environmental Policy (also Biological Sciences 661 and Agriculture and Life Sciences 661)
Fall and spring. 6 credits. Limited to 12 students. Prerequisite: permission of instructor. This is a two-semester course.
Sec, to be arranged. D. Pimentel.
This course uses an interdisciplinary approach to focus on complex environmental and energy problems. Ten to twelve students, representing several disciplines, investigate significant environmental problems. The research team spends two semesters preparing a scientific report for publication in *Science* or *BioScience*.

B&SOC 469 Food, Agriculture, and Society (also Biological Sciences 469 and Science and Technology Studies 469)
Spring. 3 credits. Prerequisite: an introductory ecology course or permission of instructor. There is a possible fee for course reading material.
Lecs, T R 1:25–2:40 plus disc to be arranged. A. G. Power.
A multidisciplinary course that deals with the social and environmental impact of food production in the United States and developing countries. Agroecosystems of various kinds are analyzed from biological, economic, and social perspectives. The impacts of traditional, conventional, and alternative agricultural technologies are critically examined in the context of developed and developing economies. Specific topics include pest management, soil conservation, farm labor, land reform, biotechnology, and international food policy.

HDFS 610 Processes in Human Development
Spring. 3 credits. Limited to 20 students. Open to graduate students and juniors and seniors in HDFS and related fields with recommendation from a faculty member and instructor's permission. Prerequisite: a minimum of one course in statistics.
M 2:30–4:25. U. Bronfrenbrenner.

HSS 625 Health Care Services and the Consumer
Fall. 3–4 credits. If using this course as a senior seminar, B&Soc majors must take it for 4 credits by writing a major paper. Permission of instructor required for registration. Enrollment limited to 10 undergraduates—preference given to HSS students.
A. Parrot.

HSS 631 Managed Health Delivery Systems: Primary-Ambulatory Care
Spring. 3 credits.
T R 2:30–3:45. R. Battistella.

S&TS 415 The Politics of Technical Decisions (also City and Regional Planning 541, Government 628)
Fall. 4 credits.
Lecs, T R 1:25–2:40. M. Dennis.

[S&TS 427 Environmental Risk and Public Policy (also Government 427)
Fall. 4 credits. Limited enrollment. Next offered 1993–94.
S. Jasanoff.]

S&TS 688 International Environmental Policy (also Government 687)
Spring. 4 credits.
S. Jasanoff.

Other Courses

B&SOC 375 Independent Study
Fall or spring. 1–4 credits. Prerequisite: must have written permission of faculty supervisor and Biology and Society major.
Staff.
Projects under the direction of a Biology and Society faculty member are encouraged as part of the program of study within the student's concentration area. Applications for research projects are accepted by individual faculty members. Students may enroll for 1–4 credits in Biology and Society 375 (Independent Study) with written permission of the faculty supervisor and may elect either the letter grade or the S-U option. Students may elect to do an independent study project as an alternative to, or in advance of, an honors project. Applications and information on faculty research, scholarly activities, and undergraduate opportunities are available in the Biology and Society office, 275 Clark Hall. Independent study credits may not be used in completion of the major requirements.

B&SOC 400 Undergraduate Seminar
Fall or spring. Variable credit. May be repeated for credit.
Staff.
From time to time different seminars on topics of interest to undergraduates are offered. Topics and instructors are listed in the biology and society supplement issued at the beginning of each semester.

B&SOC 499 Honors Project
Fall or spring; two-semester projects are acceptable. 3–5 credits each term with a maximum of 8 credits for the entire project. Open only to biology and society students in their senior year.
Staff.
Students enrolled in Biology and Society 499 will receive a letter grade at the end of their final term, whether or not they complete a thesis and whether or not they are recommended for honors. Students enrolled for the whole year in 499 may receive either a letter grade for both terms or a grade of "R" for the first term with a letter grade for both terms submitted at the end of the second term. When a student is enrolled for two terms, the student and the thesis adviser must reach a clear agreement at the outset as to which grade will be assigned for the first term and on the basis of what sort of work. Minimally an honors thesis outline and bibliography should be completed during the first term. Applications and information are available in the Biology and Society office, 275 Clark Hall.

Cognitive Studies Program

F. Keil (psychology), S. McConnell-Ginet (linguistics), codirectors. B. Bloom, R. Constable, B. Donald, D. Huttenlocher, G. Salton, A. Segrê, D. Subramanian, C. Tomasi (computer science); J. Dunn, J. Novak, R. Ripple (education); R. Canfield, S. Ceci, J. Condry, B. Koslowski, B. Lust, M. Potts, S. Robertson, G. Suci (human development and family studies); J. Russo (JGSM); J. Bowers, G. Chierchia, G. N. Clements, A. Cohn, J. Gair, W. Harbert, S. Hertz, A. Jongman, A. Landman, J. Lantolf, S. McConnell-Ginet, C. Rosen, M. Suñer, L. Waugh, J. Whitman (linguistics); A. Nerode, R. Shore (mathematics); R. Boyd, M. Crimmins, C. Ginet, H. Hodes, S. Shoemaker (philosophy); J. Cutting, R. Darlington, D. Field, B. Finlay, E. Gibson, B. Halpern, A. Isen, F. Keil, C. Krumhansl, H. Levin, E. Spelke (psychology)

Cognitive studies is comprised of a number of disciplines that are linked by a major concern with such fundamental capacities of the mind as perception, memory, reasoning, language, and the organization of motor action. In the College of Arts and Sciences these disciplines are represented in the departments of Computer Science, Linguistics, Mathematics, Philosophy, and Psychology. Elsewhere in the university they are represented in the Department of Human Development and Family Studies (College of Human Ecology), the Section of Neurobiology and Behavior (Division of Biological Sciences), and the Department of Education (College of Agriculture and Life Sciences).

The issues addressed in cognitive studies arise at several levels. At the broadest level are problems of characterizing such basic notions as "mind," "knowledge," "information," and "meaning." At a more specific level are questions regarding the abstract operating principles of individual components of the mind, such as the components underlying visual perception, language ability, and understanding of concepts. These principles concern the organization and behavior of the components and also how the components develop and change. And at the most specific level are questions about the properties of the elementary computational structures and processes that constitute these components.

Important insights into issues of these kinds have been achieved in recent years as a result of the various cognitive studies disciplines converging in their theoretical and methodological approaches. It is this convergence, in fact, that warrants grouping the disciplines together under the single term "cognitive studies." Even greater progress can be expected in the future as a consequence of increasing cooperation among the disciplines.

Undergraduate Concentration

The committee for undergraduate concentration in cognitive studies consists of: Devika Subramanian, computer science, 5–9189, 5141 Upson Hall, devika@cs.cornell.edu; James Gair, linguistics, 5–5110, 407 Morrill Hall, JWG@cornella; Carl Ginet, philosphy, 5–6818, 224 Goldwin Smith, R94J@cornella; and David Field, psychology, 5–6393, 250 Uris Hall, DJFX@CornellA.

The undergraduate concentration in cognitive studies provides a framework for the design of structured, individualized programs of study in this growing interdisciplinary field. Such programs of study are intended to serve as complements to intensive course work in a single discipline as represented by an individual department. It is considered crucial that students gain a strong background in an individual department, independent of their work in the concentration. This background provides both a foundation and a focus for the concentration work.

In light of the importance of a strong background in an individual department, it is required that a student seeking admission to the concentration have completed or plan to complete any three courses in one department from among the list of courses below. (Such a student will typically be a major in the department, but being a major is not necessary. The Section of Neurobiology and Behavior counts as a department here.) These three courses are, however, the only requirement for admission. To enter the concentration formally, the student should consult with the concentration director, who will assign the student a concentration adviser (from among the faculty listed above) who has expertise in the student's main areas of interest.

The concentration requires that the student take several courses from departments other than the one from which the student takes the three courses needed for admission to the concentration. The student must gain approval for this selection of courses from the concentration adviser. The courses will generally be chosen from among the list below, but other courses (including independent study) are permissible in individual cases.

In addition to assisting in and approving the student's selection of courses, the concentration adviser serves as a general source of information about the field of cognitive studies, relevant resources around the university, and job and graduate school opportunities. For further information, consult the undergraduate committee listed above.

Graduate Minor

For information, consult the program office (225 Uris Hall, 255–6431, or the graduate field representative, Barbara Lust 255–0829, xev @ Cornella).

Courses

Computer Science

COM S 172 An Introduction to Artificial Intelligence
Spring. 4 credits.

COM S 211 Computers and Programming
Fall or spring. 3 credits.

COM S 212 Modes of Algorithmic Expression
Fall or spring. 4 credits.

COM S 280 Discrete Structures
Fall or spring. 4 credits.

COM S 381 (or 481) Introduction to Theory of Computing
Fall. 3 or 4 credits.

COM S 410 Data Structures
Fall or spring. 4 credits.

COM S 411 Programming Languages and Logics
Fall. 4 credits.

COM S 472 Foundations of Artificial Intelligence
Fall. 3 credits.

COM S 473 Practicum in Artificial Intelligence
Fall. 2 credits.

COM S 482 Introduction to Analysis of Algorithms
Spring. 4 credits.

COM S 486 Applied Logic (also Mathematics 486)
Fall. 4 credits.

Education (College of Agriculture and Life Sciences)

EDUC 210 Psychology of Learning and Memory
Fall. 3 credits.
J. A. Dunn.

EDUC 301 Knowing and Learning in Science and Mathematics
Fall. 3 credits.
J. Trumbull.

EDUC 312 Learning to Learn
Spring. 3 credits.
J. Novak.

Human Development and Family Studies (College of Human Ecology)

HDFS 331 Learning in Children
Fall. 3 credits.
M. Potts.

HDFS 333 Cognitive Processes in Development
Spring. 3 credits.
G. Suci.

[HDFS 334 The Growth of the Mind
Spring. 4 credits. Not offered 1992–93.
B. Lust.]

HDFS 432 Cognitive Development and Education
Spring. 3 credits.
M. Potts.

HDFS 436 Language Development (also Psychology 436 and Linguistics 436)
Spring. 4 credits.
B. Lust.

HDFS 438 Thinking and Reasoning
Fall. 3 credits.
B. Koslowski.

[HDFS 472 Typical and Atypical Intellectual Development
Spring. 3 credits. Not offered 1992–93.
S. Ceci.]

Linguistics

LING 101 Theory and Practice of Linguistics
Fall or spring. 4 credits.
Staff.

LING 201 Introduction to Phonetics and Phonology
Spring. 4 credits.
A. Cohn.

LING 203 Introduction to Syntax and Semantics
Fall. 4 credits.
J. Whitman, S. McConnell-Ginet.

[LING 264 Language, Mind, and Brain
Fall. 4 credits. Not offered 1992–93.
J. Bowers.]

LING 301–302 Phonology I, II
Fall and spring. 4 credits each term.
D. Zec, fall; staff, spring.

LING 303–304 Syntax I, II
Fall and spring. 4 credits each term.
M. Diesing, fall; staff, spring.

LING 309–310 Morphology I, II
Fall and spring. 4 credits each term.
L. Waugh, fall; staff, spring.

[LING 316 Introduction to Mathematical Linguistics
Spring. 4 credits. Not offered 1992–93.
F. Landman.]

LING 319–320 Phonetics I, II
Fall and spring. 4 credits each term.
A. Jongman.

[LING 325 Pragmatics
Spring. 4 credits. Not offered 1992–93.
S. McConnell-Ginet.]

LING 334 Non-Linear Syntax
Spring. 4 credits.
C. Rosen.

[LING 370 Language and Cognition (also Psychology 370)
Spring. 4 credits. Not offered 1992–93.
J. Bowers.]

LING 400 Semiotics and Language
Spring. 4 credits.
L. Waugh.

LING 401 Language Typology
Fall. 4 credits.
J. Gair.

[LING 412 Process and Knowledge in Speech Perception and Word Recognition
Spring. 4 credits. Not offered 1992–93.
Staff.]

[LING 418 Nonlinear Phonology
Fall. 4 credits. Not offered 1992–93.
A. Cohn.]

[LING 420 Fundamentals of Speech Acoustics
Spring. 4 credits. Not offered 1992–93.
Staff.]

LING 421–422 Semantics I, II
Fall and spring. 4 credits each term.
G. Chierchia, staff.

LING 436 Language Development (also Psychology 436 and HDFS 436)
Spring. 4 credits.
B. Lust.

[LING 450 Computational Linguistics
Fall. 4 credits. Not offered 1992–93.
F. Landman.]

Mathematics

[MATH 481 Mathematical Logic (also Philosophy 431)
Fall. 4 credits. Not offered 1992–93.]

[MATH 483 Intensional Logics and Alternatives to Classical Logics (also Philosophy 436)
Spring. 4 credits. Not offered 1992–93.]

[MATH 486 Applied Logic (also Computer Science 486)
Fall. 4 credits. Not offered 1992–93.]

MATH 487 Applied Logic II
Spring. 4 credits.

Neurobiology and Behavior (Division of Biological Sciences)

BIO S 221 Neurobiology and Behavior I: Introduction to Behavior
Fall. 3 or 4 credits.
C. Wolcott.

BIO S 222 Neurobiology and Behavior II: Introduction to Neurobiology
Spring. 3 or 4 credits.
A. Schneiderman.

[BIO S 326 The Visual System
Spring. 4 credits. Not offered 1992–93.
H. Howland.]

BIO S 328 Biopsychology of Learning and Memory (also Psychology 332)
Spring. 3 credits.
T. DeVoogd.

[BIO S 396 Introduction to Sensory Systems (also Psychology 396)
Spring. 3 or 4 credits. Not offered 1992–93.
B. Halpern.]

[BIO S 424 Neuroethology
Fall. 3 credits. Not offered 1992–93.
C. D. Hopkins.]

BIO S 492 Sensory Function (also Psychology 492)
Spring. 4 credits.
H. Howland, B. Halpern.

BIO S 496 Bioacoustic Signals in Animals and Man
Spring. 3 credits.
C. Clark, R. R. Hoy.

Philosophy

PHIL 231 Introduction to Formal Logic
Fall or spring. 4 credits.
J. Jarrett.

[PHIL 261 Knowledge and Reality
Spring. 4 credits. Not offered 1992–93.
J. Jarrett.]

PHIL 262 Philosophy of Mind
Fall. 4 credits.
S. Shoemaker.

PHIL 286 Science and Human Nature
Spring. 4 credits.
R. Boyd, N. Sturgeon.

[PHIL 318 Twentieth-Century Philosophy
Spring. 4 credits. Not offered 1992–93.]

PHIL 331 Formal Logic
Spring. 4 credits.
H. Hodes.

[PHIL 332 Philosophy of Language
Spring. 4 credits. Not offered 1992–93.
M. Crimmins.]

PHIL 361 Metaphysics and Epistemology
Spring. 4 credits.

PHIL 381 Philosophy of Science: Knowledge and Objectivity
Fall. 4 credits.
R. Boyd.

[PHIL 382 Philosophy and Psychology
4 credits. Not offered 1992–93.]

[PHIL 389 Philosophy of Science: Evidence and Explanation
4 credits. Not offered 1992–93.]

[PHIL 431 Deductive Logic (also Mathematics 481)
Fall. 4 credits. Not offered 1992–93.]

[PHIL 433 Philosophy of Logic
4 credits. Not offered 1992–93.]

[PHIL 436 Intensional Logic (also Mathematics 483)
Spring. 4 credits. Not offered 1992–93.]

PHIL 437 Problems in the Philosophy of Language
Spring. 4 credits.
M. Crimmins.

[PHIL 461 Metaphysics
Spring. 4 credits. Not offered 1992–93.]

[PHIL 483 Philosophy of Choice and Decision
Fall. 4 credits. Not offered 1992–93.
M. Crimmins.]

Psychology

PSYCH 205 Perception
Spring. 3 credits.
Staff.

PSYCH 209 Development
Spring. 4 credits.
F. Keil.

PSYCH 214 Knowledge and Reasoning
Spring. 3 credits.
C. Krumhansl.

[PSYCH 215 Psycholinguistics
Fall. 3 or 4 credits. Not offered 1992–93.
Staff.]

[PSYCH 305 Visual Perception
Fall. 4 credits. Not offered 1992–93.
J. Cutting.]

[PSYCH 308 Perceptual Learning
Fall. 3 credits. Not offered 1992–93.
Staff.]

[PSYCH 309 Development of Perception and Representation
Fall. 3 credits. Not offered 1992–93.
E. Spelke.]

[PSYCH 313 Perceptual and Cognitive Processes
Spring. 4 credits. Not offered 1992–93.
Staff.]

[PSYCH 314 The Social Psychology of Language
Spring. 4 credits. Not offered 1992–93.
Staff.]

[PSYCH 316 Auditory Perception
Spring. 3 or 4 credits. Not offered 1992–93.
Staff.]

PSYCH 332 Biopsychology of Learning and Memory (also Neurobiology and Behavior 328)
Spring. 3 credits.
T. DeVoogd.

PSYCH 342 Human Perception: Applications to Computer Graphics Art, and Visual Display
Fall. 3 credits.
D. Field.

PSYCH 361 Biopsychology of Normal and Abnormal Behavior (also Nutritional Sciences 361)
Fall. 3 credits.
B. Strupp.

[PSYCH 370 Language and Cognition (also Linguistics 370)
Spring. 4 credits. Not offered 1992–93.
J. Bowers.]

[PSYCH 396 Introduction to Sensory Systems (also Biological Sciences 396)
Spring. 3 or 4 credits. Not offered 1992–93.
B. Halpern.]

PSYCH 412 Human Experimental Psychology Laboratory
Spring. 4 credits.
D. Field.

[PSYCH 414 Comparative Cognition
Spring. 3 credits. Not offered 1992–93.
E. Spelke.]

PSYCH 415 Comparative Cognition
Spring. 3 credits.
E. Spelke.

[PSYCH 415 Concepts, Categories, and Word Meanings
Fall. 4 credits. Not offered 1992–93.
F. Keil.]

[PSYCH 416 Psychology of Language
Spring. 4 credits. Not offered 1992–93.
Staff.]

PSYCH 417 The Origins of Thought and Knowledge
Spring. 4 credits.
F. Keil.

PSYCH 418 Psychology of Music
Fall. 3 or 4 credits.
C. Krumhansl.

[PSYCH 425 Brain and Behavior
Fall. 3 or 4 credits. Not offered 1992–93.
B. Finlay.]

PSYCH 436 Language Development (also Linguistics 436 and HDFS 436)
Spring. 4 credits.
B. Lust.

[PSYCH 465 Mathematical Psychology
Spring. 4 credits. Not offered 1992–93.]

[PSYCH 490 History and Systems of Psychology
Fall. 4 credits. Not offered 1992–93.
Staff.]

PSYCH 492 Sensory Function (also Biological Sciences 492)
Spring. 4 credits.
H. Howland, B. Halpern.

Graduate Courses and Seminars

The following courses and seminars are generally for graduate students only. However, some may be appropriate for advanced undergraduates. The director of the concentration must approve an undergraduate's use of any of these for satisfying the concentration requirements.

COGST 773–774 Proseminar in Cognitive Studies I and II
Fall, spring. 2 credits each semester.
R 1:25–2:40. F. Keil and staff.
This year-long seminar is intended to provide graduate students with an interdisciplinary introduction to the study of knowledge, its representation, acquisition, and use.

COGST 600/700 Graduate Seminars

HDFS 600/700 Graduate Seminars

LING 600/700 Graduate Seminars

MATH 581 Logic

MATH 655 Mathematical Foundations of Computer Modeling and Simulation

MATH 684 Recursion Theory

MATH 688 Automated Theorem Proving

PHIL 700 Graduate Seminars

PSYCH 500–700 Graduate Seminars

College Scholar Program

Dean Lynne Abel, director, 55 Goldwin Smith Hall, 255–3386.

The College Scholar program is described in the introductory section of Arts and Sciences.

COLLS 397 Independent Study
Fall or spring. 1–4 credits. Prerequisite: permission of program fice.

COLLS 499 Honors Research
Fall or spring. 1–8 credits; a maximum of 8 credits may be earned for honors research. Prerequisite: permission of program director. Each participant must submit a brief proposal approved by the honors committee.

East Asia Program

140 Uris Hall

T. P. Lyons, director; S. Akiba, R. Barker, K. W. Brazell, S. G. Cochran, J. Cody, B. de Bary, E. M. Gunn, J. V. Koschmann, J. M. Law, L. C. Lee, Y. Li, D. R. McCann, J. R. McRae, T. L. Mei, V. Nee, T. J. Pempel, C. A. Peterson, J. R. Piggott, D. L. Poston, V. Pucik, M. Rebick, N. Sakai, P. S. Sangren, T. Shiraishi, V. B. Shue, R. J. Smith, R. J. Sukle, H. Wan, J. K. Wheatley, J. Whitman, M. W. Young

East Asian studies at Cornell is led by thirty-two faculty members from five colleges, who participate in a program of research and teaching on the civilizations and cultures of East Asia. Courses are offered through various departments in most of the humanities and social science disciplines, as well as in the fields of business, city and regional planning, international and comparative labor relations and rural sociology. Language courses in Mandarin, Cantonese, Korean, and Japanese are offered, in addition to the Full-year Asian Language Concentration (FALCON) in Japanese and Mandarin. Undergraduates major in the Department of Asian Studies and concentrate on the language and culture of one East Asian country, while graduate students may work toward an M.A. in East Asian studies, a dual M.B.A./M.A. degree, or an M.A./Ph.D. degree in a discipline such as agricultural economics, anthropology, city and regional planning, government, history, history of art, linguistics, literature, rural sociology, or sociology. A variety of fellowships, travel grants, awards, and assistantships are available for graduate students in East Asian studies.

The formal program of study is enriched by a variety of extracurricular activities, including a Chinese language house, various film series, career workshops, art exhibits, and numerous lectures, symposia and performances related to East Asia. The Wason Collection in Olin Library is a comprehensive collection of books on East Asia in Western languages, Japanese, and Chinese. The Mary Rockwell Galleries of the Herbert F. Johnson Museum of Art have an excellent collection of East Asian art.

Freshman Writing Seminars

For information about the requirements for freshman writing seminars and descriptions of seminar offerings, see the John S. Knight Writing Program section, and consult the John S. Knight Writing Program brochure, available from college registrars in August for the fall term and in November for the spring term.

Human Biology Program

J. Haas (nutritional sciences), director, 211 Savage Hall, 255-8001; R. Dyson-Hudson (anthropology), B. Finlay (psychology), J. Fortune (physiology/women's studies), E. Frongillo (nutritional sciences), R. Johnston (psychology), K.A.R. Kennedy (ecology and systematics/anthropology), D. Levitsky (nutritional sciences), R. Martorell (nutritional sciences), D. McClearn (ecology and systematics), D. L. Pelletier (nutritional sciences), W. Provine (ecology and systematics/history), R. Robertshaw (physiology), S. Robertson (human development and family studies), R. Savin-Williams (human development and family studies), M. Small (anthropology)

Human biology integrates the methods and theories of many disciplines, such as biological anthropology, nutrition, neurobiology, physiology, psychology, demography, ecology, genetics, and paleontology, into a comprehensive study of biological diversity in *Homo sapiens*. A central focus of this interdisciplinary approach to the study of the human organism is an understanding of evolutionary processes that explain our biological variation through space and time. The program of study seeks to educate future biological scientists to address the concerns of a society that is becoming more demanding of the scientific community to place its specialized biological knowledge in a broad context. The human biology curriculum is of particular relevance to undergraduate students in premedical and predentistry programs, biological anthropology, nutrition, human development, ecology and systematics, psychology, physiology, genetics, and the health-related sciences. It serves to bring together students with a common interest in humankind as defined from these diverse fields and to provide a forum for student-faculty interaction on various topics relating to human evolution and biological diversity. Human biology is not a major but a curriculum of study that provides majors in various departments with a program for selecting elective courses that deal with the biology of the human species. Students in their junior year may develop a program of study in human biology while majoring in a number of different departmental fields.

Basic Requirements

The requirements for a program of study in human biology are designed to ensure sufficient background in physical sciences and mathematics to enable the student to pursue a wide range of interests in the fields of modern biological sciences, anthropology, and fields related to the evolution and physical diversity of the human species. Adjustments may be made in these requirements, depending upon the student's academic background and affiliation with colleges and schools within the university.

The basic requirements are one year of introductory biology (Biological Sciences 101–103 plus 102–104 or 105–106 or Biological Sciences 100 offered during the six-week Cornell Summer Session); one year of general chemistry (Chemistry 103–104 or 207–208 or 215–216); one year of college mathematics (Mathematics 111–112 or 105–106 or 111–105); one course in genetics (Biological Sciences 281 or 282); one course in biochemistry (Biological Sciences 231, 330 or 331). It is recommended that students planning graduate careers in biological anthropology, psychology, and related fields in the medical and nutritional sciences take a course in statistics. Students should consult their faculty adviser in human biology for help in selecting appropriate courses.

Elective courses should be taken that will enable the student to acquire breadth in the subject matter of human biology outside of their departmental major. Therefore only 6 of the 15 human biology elective credits may also fulfill requirements for the major. Courses should be selected that also provide sufficient exposure to the integration of basic anatomical and physiological sciences with the behavior of individuals and groups within the context of evolutionary theory and ecology. The courses listed below are representative of the offerings in human biology and are included to assist the student in organizing a curriculum of study. They are organized into three groups that reflect the three levels of integration noted above: (1) human anatomy and physiology, (2) human behavior, and (3) human evolution and ecology. Students should choose at least one course from each of these areas of integration. It is anticipated that the student will include in a program of study at least one of the laboratory courses offered. It is expected that a student will take a minimum of 15 credits from among these courses.

There is no foreign language requirement for human biology beyond what is dictated by specific departments and colleges. The requirements for the human biology curriculum are set alongside requirements of the undergraduate majors as these are defined by different departments. Students with independent majors may design their own programs of study under the guidelines provided by their college. Although a student may indicate an interest in human biology in the freshman year and be able to obtain early guidance from a faculty adviser representing the curriculum of study, it is more usual for students to establish their course programs in the first semester of the junior year. The student may request one of the faculty advisers in his or her department who is listed as faculty in human biology to be their principal adviser, or he or she may have an adviser in the department of the major and seek the advice of a human biology faculty adviser in matters pertaining to satisfaction of the requirements. In certain cases a faculty adviser may represent both the major and the curriculum of study in human biology.

Courses

Human Anatomy and Physiology

BIO S 214 The Biological Basis of Sex Differences (also Women's Studies 214)
Spring. 3 credits.

BIO S 274 Functional and Comparative Morphology of Vertebrates
Spring. 4 credits.

BIO S 311 Introductory Animal Physiology, Lectures (also Veterinary Medicine 346)
Fall. 3 credits.

BIO S 319 Animal Physiology Experimentation (also Veterinary Medicine 378)
Fall. 3 credits.

BIO S 458 Mammalian Physiology
Spring. 3 credits.

BIO S 474 Laboratory and Field Methods in Human Biology (also Anthropology 474)
Spring. 5 credits.

NS 115 Nutrition and Health: Concepts and Controversies
Fall or spring. 3 credits.

NS 222 Maternal and Child Nutrition
Spring. 3 credits.

NS 331 Physiological and Biochemical Bases of Human Nutrition
Spring. 3 credits.

NS 361 Biology of Normal and Abnormal Behavior (also Psychology 361)
Fall. 3 credits.

NS 441 Nutrition and Disease
Fall. 4 credits.

PSYCH 322 Hormones and Behavior (also Biological Sciences 322)
Spring. 3 or 4 credits.

PSYCH 425 Brain and Behavior
Fall. 3 or 4 credits.

VET M 331 Medical Parasitology
Fall. 2 credits.

Human Behavior

Anthr 490 Primates and Evolution
Spring. 4 credits.

BIO S 301 Biology and Society I: The Social Construction of Life (also Biology and Society 301)
Fall. 3 credits.

BIO S 427 Animal Social Behavior
Fall. 3 credits.

HDFS 344 Infant Behavior and Development
Fall. 3 credits.

HDFS 464 Developmental Theory and Research on Homosexuality
Fall. 4 credits.

HDFS 645 Seminar in Infancy: Newborn Behavioral Organization
Spring. 3 credits.

HSS 315 Human Sexuality: A Biosocial Perspective
Fall, spring, or summer. 3 credits.

NS 245 Social Science Perspectives of Human Nutrition
Fall. 3 credits.

NS 347 Human Growth and Development: Biological and Behavioral Interactions (also Human Development and Family Studies 347)
Spring. 3 credits.

PSYCH 326 Evolution of Human Behavior
Fall. 4 credits.

PSYCH 425 Brain and Behavior
Fall. 3 or 4 credits.

R SOC 408 Human Fertility in Developing Nations (also B Soc 404)
Fall. 4 credits.

R SOC 438 Social Demography
Fall. 3 credits.

Human Evolution and Ecology

ANTHR 101 Introduction to Anthropology: Biological Perspectives on the Evolution of Human Kind
Fall. 3 credits.

ANTHR 203 Early People: The Archaeological and Fossil Record (also Archaeology 203)
Fall. 3 credits.

ANTHR 214 Humankind: The Biological Background
Fall. 3 credits.

ANTHR 490 Primates and Evolution
Spring. 4 credits.

BIO S 207 Evolution
Fall. 3 credits.

BIO S 261 Ecology and the Environment
Fall or summer. 4 credits.

BIO S 272 Functional Ecology: How Animals Work
Spring. 4 credits.

BIO S 275 Human Biology and Evolution (also Anthropology 275 and Nutritional Sciences 275)
Fall. 3 credits.

BIO S 371 Human Paleontology (also Anthropology 371)
Fall. 4 credits.

BIO S 378 Evolutionary Biology
Spring. 4 credits.

BIO S 461 Population and Evolutionary Ecology
Fall. 4 credits.

BIO S 464 Microevolution and Macroevolution
Spring. 4 credits.

BIO S 470 Ecological Genetics
Spring. 4 credits.

BIO S 471 Mammology
Fall. 4 credits.

BIO S 481 Population Genetics
Fall. 4 credits.

BIO S 482 Human Genetics and Society
Fall. 3 credits.

BIO S 484 Molecular Evolution
Spring. 3 credits.

BIO S 673 Human Evolution: Concepts, History and Theory (also Anthropology 673)
Fall. 3 credits.

B&SOC 447 History of Biology–Evolution (also History 447)
Fall. 4 credits.

HSS 330 Ecology and Epidemiology of Health
Fall. 3 credits.

NS 306 Nutritional Problems of Developing Nations
Spring. 3 credits.

PSYCH 326 Evolution of Human Behavior
Fall. 4 credits.

R SOC 201 Population Dynamics
Spring. 3 credits.

VET M 331 Medical Parasitology
Fall. 2 credits.

VET M 664 Introduction to Epidemiology
Spring. 3 credits.

Independent Major Program

Dean Lynne Abel, director, 55 Goldwin Smith Hall, 255-3386.

The Independent Major Program is described in the introductory section of Arts and Sciences.

IM 351 Independent Study
Fall or spring. 1–4 credits. Prerequisite: permission of the program office.

IM 499 Honors Research
Fall or spring. 4–8 credits; a maximum of 8 credits may be earned for honors research. Prerequisite: permission of program director. Each participant must submit a brief proposal approved by the honors committee.

Intensive English Program

E. J. Beukenkamp, director

This full-time, noncredit, nondegree program is designed to meet the requirements of foreign students who need to acquire proficiency in English to pursue university-level studies in the United States, as well as for visitors, personnel in business, hospitality industry, legal work, medicine, and others seeking competence in the language.

The intensive nature of the program leads to a command of the language in all its aspects—listening, speaking, reading, and writing—in the shortest possible time.

Integrated courses are offered both fall and spring semesters at three levels: beginning (Test of English as a Foreign Language [TOEFL] score below 370), intermediate (TOEFL score below 450), and advanced.

Students who have gained full admission to, or who already are registered in, degree-granting programs at Cornell should consult the section, Modern Languages and Linguistics, for information regarding courses in English as a second language.

The Intensive English Program is administered by the Department of Modern Languages and Linguistics, Cornell University, Morrill Hall, Ithaca, New York 14853-4701, U.S.A. Application materials and information are available directly from the program or by calling 607/255-4863.

International Relations Concentration

P. Katzenstein, faculty coordinator

Undergraduates interested in an international relations concentration should see the TA in charge, whose name is posted on Professor Katzenstein's office door (McGraw B-7).

International Relations is one of the university's strongest, most diverse undergraduate fields. Cornell offers dozens of courses in many departments and several colleges which provide a strong grounding in the field, including courses in government, economics, history, rural sociology, nutrition, modern languages and literature, international comparative labor relations, and others. The purpose of the International Relations Concentration is to provide a structure for students who will go on to specialize in careers in international law, economics, agriculture, foreign trade, international banking, government service, international organizations, or another cultural or scholarly activity. Some students will major in one of the traditional departments, such as history, government, or economics, while others will design an independent major. Still others will major in a different discipline, but seek to gain a basic understanding of important international problems.

The requirements for a concentration in International Relations are as follows:

1) Government 181 or 281, Introduction to International Relations (fall).
2) One appropriate 300-level government course, either in international relations or in the foreign policy of a particular nation.
3) Two courses in Economics, chosen from among the following offerings:
   a) Either Economics 363, International Economics (fall) or Economics 202, Introduction to the World Economy (spring).
   b) Economics 361, International Trade Theory (fall).
   c) Economics 362, International Monetary Theory (spring).
   d) EITHER Economics 367, Comparative Economic Systems: Soviet Union and Europe (fall), OR Economics 368, Comparative Economic Systems: United States, Europe and the Soviet Union (spring).
   e) Economics 371, Economic Development (fall); Economics 373, International Specialization and Economic Development (fall or spring); Economics 374, National and International Food Economics (spring).
   f) Economics 365, Latin American Economics (fall or spring).
4) History 314, History of American Foreign Policy II (spring).
5) Any history course dealing with a modern nation other than the United States.

Under certain conditions, it may be possible to substitute other courses for those listed above.

The typical choices among the sequences listed above would be to study European history and government and Economics 361, 362, or 368, or Third World history and government and Economics 371 and other listed economics courses. *All courses used to fulfill concentration requirements must be taken for a letter grade.* In addition, students are strongly encouraged to acquire full proficiency in a modern foreign language, to elect additional related courses in international affairs, and to spend at least one semester abroad during their undergraduate education. Students choosing to concentrate in International Relations should come see the concentration coordinator in Uris 152B (phone: 255-8938) for further information.

Center for International Studies

See Interdisciplinary Centers, Programs, and Studies, p. 18.

Program of Jewish Studies

D. I. Owen, director (Near Eastern and ancient Jewish history), G. Altschuler (American-Jewish History), R. Brann (Hebrew and Judeo-Arabic literatures), S. L. Gilman (German Jewish history and literature and Yiddish literature), S. Goodhart (Holocaust studies), P. Hyams (Medieval Jewish History), L. Kant (Near Eastern religions), S. T. Katz (Jewish history, and Holocaust Studies), G. Korman (Jewish labor history and Holocaust studies), Richard Polenberg (American-Jewish history), J. Porte (American-Jewish writers), D. S. Powers (history of Jews in Islamic lands), G. Rendsburg (Biblical studies and Semitic languages), E. Rosenberg (Jews in modern European and Anglo-American literature), N. Scharf (Hebrew language), D. Schwarz (English-Jewish Writers), S. Shoer (Hebrew and Yiddish languages)

The Program of Jewish Studies is a university-wide program housed in the College of Arts and Sciences. It was founded as an extension of the Department of Semitic Languages and Literatures (now the Department of Near Eastern Studies) in 1973 and attained status as an intercollegiate program in 1976.

The program has grown out of the conviction that Judaic civilization merits its own comprehensive and thorough treatment and that proper understanding of any culture is inconceivable without adequate knowledge of the language, literature, and history of the people that created it. Accordingly, the offerings in the areas of Hebrew language and literature have been considerably expanded, and courses in ancient, medieval, and modern Jewish history have been added to the program.

It is a broadly based, interdisciplinary program, bringing together faculty from the various Cornell colleges and schools.

The Program of Jewish Studies supports teaching and research in the overall area of Judaic Studies. It is a secular, academic program, the interests of which are diverse and cross-cultural. The program recognizes its special relationship to teaching and research in classical Judaica and Hebraica which are pursued by the members of the Department of Near Eastern Studies.

Although further expansion of the program is anticipated, it presently enables students to obtain basic instruction and specialization in the fields of Semitic languages; the Hebrew Bible; the apocryphal and Tannaitic literatures; medieval and modern Hebrew literature;

ancient, medieval, and modern Jewish history; Holocaust studies and modern Jewish thought. In some of these fields students may take courses both on graduate and undergraduate levels. Faculty throughout the university provide breadth to the program by offering courses in related areas of study.

Courses Offered

JWST 101–102 An Introduction to Jewish Classics (also Near Eastern Studies 121–122 and Religious Studies 121–122)
101, fall; 102, spring. 3 credits each semester. Freshman seminar.
M W F 1:25–2:15. Staff.

JWST 103 Elementary Modern Hebrew (also Near Eastern Studies 103)
Summer. 4 credits.
N. Scharf.

JWST 105–106 Elementary Modern Hebrew I and II (also Near Eastern Studies 101–102 and Religious Studies 121–122)
Fall and spring. 6 credits each semester.
M–F. Sec 01: 9:05–9:55; 02: 10:10–11:00; 03: 11:15–12:05; 04: 1:25–2:15. S. Shoer.

JWST 125–126 The Bible as Literature in Its Ancient Near Eastern Context (also Near Eastern Studies 125–126 and Religious Studies 125–126)
Fall and spring. 3 credits each semester.
11:15–12:05. Staff.

JWST 201–202 Intermediate Modern Hebrew I and II (also Near Eastern Studies 201–202)
Fall and spring. 4 credits each semester.
M–R. Sec 01: 10:10–11:00; 02: 1:25–2:15. N. Scharf.

JWST 223 Introduction to the Bible (also Near Eastern Studies 223 and Religious Studies 223)
Fall and summer. 3 credits each semester.
1:25–2:15. G. Rendsburg.

JWST 224–225 Elementary Biblical Hebrew I & II (also Near Eastern Studies 232–235 and Near Eastern Studies 423–424)
Fall and spring. 3 credits each semester.
T R 8:40–9:55. Staff.

JWST 228 Genesis (also Near Eastern Studies 228, Near Eastern Studies 628, and Religious Studies 228)
Spring. 3 credits.
T R 10:10–11:25. G. Rendsburg.

JWST 246 Seminar in Jewish Mysticism (also Near Eastern Studies 246 and Religious Studies 246)
Fall. 3 credits. This course can also be used to fulfill the requirements of the Medieval Studies Program.
M W F 10:10–11:00.

JWST 248 Introduction to Classical Jewish History (also Near Eastern Studies 248)
Fall. 3 credits.
M W F 1:25–2:15. S. Katz.

JWST 259 Introduction to Modern Jewish History (also Near Eastern Studies 249) #
Spring. 3 credits.
M W F 10:10–11:00. S. Katz.

JWST 263 Introduction to Biblical History and Archaeology (also Archaeology 263, Near Eastern Studies 263 and Religious Studies 264
Spring. 3 credits.
T R 1:25–2:40. D. I. Owen.

JWST 274 Jewish Civilization in Eastern Europe, 1789–1939
Spring. 2 credits.
TBA. A. Nadler.
An introduction to the social, intellectual, and literary history of the Jews of Eastern Europe in the modern period, as reflected in primary texts (in English translation). The course will explore the full range of Jewish religious, cultural, and political movements of this period, such as hasidism, the haskala (Jewish englightenment), and the varieties of modern Jewish nationalism, through the prism of their greatest literary works.

JWST 284 Muslims, Christians, and Jews in Islamic Spain: Literature and Society, Comparative Literature 234, Near Eastern Studies 234, Religious Studies 234, and Spanish Literature 240)
Spring. This course can also be used to fulfill the requirements of the Medieval Studies Program.
T R 1:25–2:40. R. Brann.

JWST 301–302 Advanced Modern Hebrew I and II (also Near Eastern Studies 301–302) @
Fall and spring. 4 credits.
M W F 2:30–3:20. N. Scharf.

JWST 340 Topics in Religion: Religious Symbols in Near Eastern Late Antiquity (also Near Eastern Studies 320 and Religious Studies 340) @#
Spring. 4 credits.
T R 2:55–4:10. L. Kant.

JWST 344 The History of Early Christianity (also Near Eastern Studies 324 and Religious Studies 325)
Fall. 4 credits. This course can also be used to fulfill the requirements for the Medieval Studies Program.
T R 1:25–2:40. L. Kant.

JWST 348 Varieties of Judaism in the Graeco-Roman World (also Near Eastern Studies 348 and Religious Studies 348)
Spring. 4 credits.
T R 11:40–12:55. L. Kant.

JWST 351 Jewish Workers in Europe and America, 1835–1948 (also Industrial and Labor Relations Collective Bargaining 381)
Spring. 4 credits. Open to sophomores, juniors, and seniors.
T 1:25–4:25. G. Korman.
This course in comparative history examines the complex experiences of the Yiddish-speaking immigrant workers and their families. A special subject of interest is the extraordinary history of the Jewish working classes between 1924 and 1948.

JWST 352 The Holocaust in Historical Context: A Seminar
Spring. 4 credits. Enrollment limited to 15 students (juniors and seniors only).
M W F 1:25–2:15. S. Katz.
This seminar will center on certain of the main historical and ideological elements that arise in response to the destruction of European Jewry between 1933 and 1945. Beginning with the background of classical and modern European anti-semitism, and the failure of the Weimar Republic, we will move on to analyze in detail such topics as the Nazi program of disemancipation, the meaning of W.W. II for the "Jewish Question," the nature of the process of ghettoization, the role of technology and bureaucracy in the "Final Solution," and the character of the death camps. We shall also consider the role of the allies, the churches, and other onlookers and bystanders.

JWST 400 Seminar in Advanced Hebrew (also Near Eastern Studies 400)
Spring. 4 credits.
T R 11:40–12:55. N. Scharf.

JWST 411 African Americans and Jewish Americans: Identities, Parallels, and Conflicts (also Africana Studies and Research Center 411 and German Studies 411)
Spring. 4 credits. Prerequisite: permission of instructors. Enrollment limited to 20 students.
M 12:20–2:15. W. Cross and S. Gilman.

JWST 414 History into Fiction: Nazis and the Literary Imagination (also Comparative Literature 404, and English 404)
Fall. 4 credits. Enrollment limit—five JWST students.
T R 11:40–12:55. E. Rosenberg.
The twelve years of Hitler's rule remain the most critical, "longest" years of the century. We shall read some seven or eight texts by Anglophone and Continental novelists (and a few playwrights and poets) that explore salient features of the regime: Hitler's rise to power (e.g., Mann's "Mario and the Magician," Brecht's *Arturo Ui*, Hughes's *Fox in the Attic*); civilian life in Nazi Germany (e.g., Isherwood's *Berlin Stories*, Grass's *Tin Drum*); World War II (Boell's fiction); the Occupation (Camus's *Plague*, Nabokov's "Aleppo"); the persecution of European Jews (Sartre's "Childhood of a Leader,: Brecht's "Jewish Wife," selections from Julian Barnes's novel *History of the World*); the Holocaust (e.g., Weiss's *Investigation*, Jakov Lind's *Soul of Wood*; lyrics by Celan, Nelly Sachs, Anthony Hecht). Brief ancillary selections by historians and memorialists (Fest, Bettelheim, Ann Frank); uses of documentary materials.

JWST 420 Readings in the Hebrew Bible (also Near Eastern Studies 420 and Religious Studies 420)
Fall. 4 credits.
M W F 10:10–11:00. G. Rendsburg.

JWST 421 Readings in Biblical Hebrew Poetry (also Near Eastern Studies 421 and Religious Studies 423)
Spring. 4 credits.
T R 2:55–4:10. G. Rendsburg.

JWST 450 Undergraduate Seminar in Recent American History: Benjamin N. Cardoza and the American Judicial Tradition (also History 440)
Fall. 4 credits. Permission of instructor required.
T R 11:40–12:55. R. Polenberg.

JWST 491–492 Independent Study–Undergraduate
Fall and spring. Variable credit. Staff.

JWST 499 Independent Study–Honors
Fall and spring. Variable credit. Staff.

Courses Not Offered 1992–93.

JWST 220 Aramaic (also Near Eastern Studies 238)

JWST 221 Readings in Classical Hebrew Literature: The Art of Biblical Narrative (also Near Eastern Studies 221)

JWST 222 Readings in Classical Hebrew Literature: The Art of Biblical Poetry (also Near Eastern Studies 222)

JWST 226 Exodus and Conquest (also Near Eastern Studies 226)

JWST 227 Introduction to the Prophets (also Near Eastern Studies 227 and Religious Studies 227)

JWST 228/628 Genesis (also Near Eastern Studies 228 and 628)

JWST 229 Women in the Hebrew Bible (also Near Eastern Studies 292 and Women's Studies 292)

JWST 240 Israel: History and Geography (also Near Eastern Studies 242)

Summer.

JWST 243 Classics of Hebrew Literature, a Survey: The Hebrew Literary Tradition (also Comparative Literature 231 and Near Eastern Studies 231)

JWST 249 Jewish Sectarian Literature in Late Antiquity (also Near Eastern Studies 279 and Religious Studies 279)

JWST 250 Response to the Holocaust

JWST 251 The Holocaust: The Destruction of European Jewry, 1933–1945

JWST 254 Jurisprudence and the Holocaust

JWST 255 The Emergence of the Modern Jew: 1648–1948 (also Near Eastern Studies 245)

JWST 257 Seminar: The Eichmann Case

JWST 260 The History and Archaeology of Ancient Israel (also Archaeology 243 and Near Eastern Studies 243)

JWST 261 Ancient Seafaring (also Archaeology 275 and Near Eastern Studies 275)

JWST 264 Agriculture and Society in the Ancient Near East (also Near Eastern Studies 264)

JWST 283 The Lyrics of Love and Death: Medieval Hebrew Poetry in Translation (also Comparative Literature 333 and Near Eastern Studies 233)

JWST 293 Judaism, Christianity and Islam in Comparative Perspective (also Near Eastern Studies 293)

JWST 322 Undergraduate Seminar in Biblical Literature: Prophecy in Ancient Israel (also Near Eastern Studies 322)

JWST 332 Ancient Near Eastern Literature (also Near Eastern Studies 332)

JWST 346 Jews of Arab Lands (also Near Eastern Studies 346)

JWST 359 Anti-Semitism in Germany and the Jewish Response (also German Studies 349)

JWST 361 Interconnections in the Eastern Mediterranean World in Antiquity (also Near Eastern Studies 361)

JWST 362 The History and Archaeology of Ebla (also Near Eastern Studies 362)

JWST 365 The Divided Monarchy (also Near Eastern Studies 365)

JWST 366 The History and Archaeology of the Ancient Near East (also Archaeology 310 and Near Eastern Studies 366)

JWST 375 The Shtetl in Modern Yiddish Fiction in English Translation (also German Studies 375)

JWST 377 The Yiddish Novel in English Translation (also German Studies 377)

JWST 383 Seminar in Medieval Hebrew Literature: The Short Story (also Near Eastern Studies 303)

JWST 384 Seminar in Medieval Hebrew Literature: The Novel (also Near Eastern Studies 304)

JWST 402 Seminar in Hebrew Literature and Poetics (also Near Eastern Studies 402)

JWST 409 The Double Identity Crisis: German Jewish Women from Rahal Varnhagen to Hannah Arendt (also German Studies 409 and Women's Studies 409)

JWST 428 Medieval Hebrew Biblical Exegesis (also Near Eastern Studies 428)

JWST 444/644 The Holocaust Survivor as Author (also German Studies 444/644)

JWST 482 Readings in Judeo-Arabic: Medieval Judeo-Arabic and Hebrew Poetics (also Near Eastern Studies 432)

JWST 627 The Song of Songs (also Near Eastern Studies 627 and Religious Studies 627)

John S. Knight Writing Program

The director of the John S. Knight Writing Program is Jonathan Monroe, associate professor in the Department of Comparative Literature. Katherine Gottschalk, senior lecturer in the Department of English, is director of Freshman Writing Seminars. The program's offices are in 159 Goldwin Smith Hall (telephone: 255-4061).

M. Gilliland (Writing Workshop), K. Hjortshoj (Writing Workshop), B. LeGendre (Writing Workshop), J. Martin (Writing Workshop), J. Pierpont (Writing Workshop), D. Williams (Writing Workshop)

The John S. Knight Writing Program helps to coordinate the teaching of writing for undergraduates in six of the university's schools and colleges (the School of Industrial and Labor Relations and the colleges of Agriculture and Life Sciences; Architecture, Art, and Planning; Arts and Sciences; Engineering; and Human Ecology). The program administers writing seminars for freshmen and upperclass students, tutorial writing classes, and seminars in the teaching of writing. More than thirty academic departments participate in the program.

Advanced Writing Seminars

For upperclass students, the program collaborates with the Department of English in offering English 288–89, "Expository Writing." This course helps students write with more confidence and skill in all disciplines, while provoking inquiry about the methods and aims of particular areas of inquiry. Students may choose among a variety of sections focusing on such themes as "Writing about the Social World," "Writing in the Humanities," "Issues about Audiences," "Understanding the News," and "The Languages of Science."

Freshman Writing Seminars

For freshmen the program offers the freshman writing seminars—more than 155 different courses in the humanities, social sciences, expressive arts, or sciences. Freshman writing seminars help students write good English expository prose—prose that, at its best, is characterized by clarity, coherence, intellectual force, and stylistic control. These seminars teach writing within a field while offering freshmen the opportunity to participate in a small seminar. Although they differ widely in content, all seminars adhere to the following guidelines:

1) at least thirty pages of assigned writing
2) at least eight—and, at most, about fourteen—written assignments
3) opportunities for serious revision, not mere editing, of essays (at least some of these revising assignments may satisfy 1 and 2 above)
4) ample classroom time spent on work directly related to writing
5) reading assignments small enough—about one hundred pages a week at most—to permit regular, concentrated work on writing
6) individual conferences

Offerings change from semester to semester. Each term's freshman writing seminars are described in a brochure available from college registrars.

To ensure that students will enjoy the benefits of small writing classes, no freshman writing seminar may comprise more than seventeen students. Instead of pre-enrolling in their writing courses, students request placement in one of five writing seminars by filling out ballots available from their college registrars. Most students receive one of their highest choices. In the fall students may change their writing seminars at the Freshman Writing Seminar Exchange; and in the spring, students may change their writing seminars at the University Course Exchange. Changes can also be made at special Freshman Writing Seminar add/drop sessions held during the first two weeks of each semester.

The colleges and the school served by the program accept freshman writing seminars in fulfillment of their individual graduation requirements in categories referred to variously as "freshman writing," "oral and written expression," and the like. The program does not decide whether students may graduate: it makes courses available. Individual colleges and schools administer their own graduation requirements.

Currently most undergraduate students are required to take two freshman writing seminars. Architecture students, however, need only one. Hotel students fulfill their requirement through Hotel Administration 165, which should be taken with Hotel Administration 265 during the first two semesters at Cornell. Agriculture and life sciences students can take freshman writing seminars or choose from among a variety of other courses to fulfill their requirement.

All students who score "4" or "5" on the Princeton Advanced Placement Examination in English receive three credits. Such credits are awarded automatically; no application to the John S. Knight Writing Program or the Department of English is necessary. How

these credits may be applied to freshman writing or other distribution requirements depends on the student's college and score. All students who score "5," except architecture and fine arts students, may apply their three credits towards the writing requirements of their college. Of students who score "4," only agriculture and life science students and industrial and labor relations students may apply their three credits toward the writing requirements of their college. Students should always consult their college registrars to be certain that they understand their writing requirements.

Students who have already taken a freshman writing seminar, or who score "4" or "5" on the Princeton AP exam, or "700" or better on the English Composition or CEEB tests, may enroll, space permitting, in the following upper-level freshman writing seminars: English 270, 271, and 272.

Although there are no exemptions from college writing requirements, some students may fulfill all or part of their college's writing requirement through transfer credits or writing-course substitutions.

For work done at other institutions to be accepted as equivalent to freshman writing seminars, students should demonstrate that they have done a reasonably equivalent amount of writing in a formal course. (It is not sufficient to write, for example, one thirty-page term paper.) Students in the College of Engineering and the College of Arts and Sciences must file an "application for transfer evaluation" to request writing credit for such courses; students in other colleges should consult their college registrars.

In unusual circumstances, upper-level students may petition to use a Cornell writing course other than a freshman writing seminar to satisfy part of their writing requirement. The John S. Knight Writing Program must approve all such petitions in advance.

Although Cornell "summer writing program" seminars may fulfill college writing requirements, they do not automatically count toward those requirements. Students who have taken these courses must ask their college registrars to assign the credits in the appropriate categories.

Teaching Writing

Each summer and fall, the program offers instruction in the teaching of writing to new staff members in the freshman writing seminars and other interested instructors. Teaching Writing I, offered in the summer, is primarily a course for graduate students; the same course is offered in the fall as Teaching Writing II. The program also sponsors a summer apprenticeship program for a limited number of graduate students, and a summer seminar for faculty members interested in the teaching of writing.

Writing Workshop

The John S. Knight Writing Program offers Workshops in English Composition for freshmen (or transfer students needing writing credit) through the Writing Workshop. These tutorials in English composition are designed for students who have had little training in composition or who have serious difficulty with writing assignments.

Writing 137 and 138 are graded S-U only, and students receiving a grade of S are normally granted credit toward their college writing requirements. Students who think this course might be appropriate, including non-native speakers of English scoring less than 600 on the Test of English as a Foreign Language (TOEFL), should attend the assessment sessions offered by the Writing Workshop during orientation week each fall. The workshop also offers a walk-in service (see below) to help students with problems in essay writing. The director is Joe Martin, senior lecturer in the Writing Workshop. The workshop offices are in 174 Rockefeller Hall (telephone: 255-6349).

The Walk-In Service

Through the Walk-In Service, the Writing Workshop offers tutoring assistance in writing to any student who needs help with a writing project. The Walk-In Service has tutors available during the academic year in 174 Rockefeller and north- and west-campus residential areas. The director is Mary Gilliland. For information contact the Writing Workshop, 174 Rockefeller Hall, 255–6349.

Freshman Writing Seminar

WRIT 137–138 Workshops in English Composition

137, fall; 138, spring. 3 credits each term. Each section limited to 12 students. S-U grades only.

Hours to be arranged. J. Martin and staff. An intensive writing experience, this course is designed for those whose composition skills need extra attention. In class discussion, students respond to each other's work and analyze brief additional readings. The average weekly syllabus includes small classes, a tutorial with the instructor, and a paper plus revision. Each section of this course is individually shaped to respond to the needs of students in that particular class.

Latin American Studies

Lourdes Benería, Robert Blake, David Block, Debra Castillo, Carlos Castillo-Chavez, Tom Davis, Eleanor Dozier, Gary Fields, William Goldsmith, Jere Haas, Jean-Pierre Habicht, John Henderson, Thomas Holloway, Zulma Iguina, Billie Jean Isbell, Steven Jackson, Teresa Jordan, Eldon Kenworthy, John Kronik, Steven Kyle, David R. Lee, Thomas Lynch, Reynaldo Martorell, Olivia Mitchell, Antonio Monegal, Luis Morató, Craig Morris, Jura Oliveira, José Piedra, Thomas Poleman, Alison Power, Mary Roldan, Jeannine Routier-Pucci, Diva Sanjur, Donald Solá, Stycos Mayone, J. Margarita Suñer, David H. Thurston, Jonathan Tittler, Armand VanWambeke, Lawrence Williams, Frank Young

The Latin American Studies Program encourages and coordinates faculty and student interests in Latin America. A variety of special lectures, films, and seminars supplement the regular course offerings. Undergraduate students may arrange an independent major in Latin American studies, and graduate students may pursue a minor in Latin American studies while majoring in the graduate field of their choice. The College of Arts and Sciences offers Latin American studies courses in anthropology, economics, government, history, and sociology. In addition, there is a varied language, literature, and linguistics curriculum in Spanish, Portuguese, and Quechua. The student may also pursue Latin American studies in the College of Agriculture and Life Sciences; the College of Architecture, Art, and Planning; the College of Human Ecology; and the School of Industrial and Labor Relations.

For further information and a current course listing, students should contact the program office at 255-3345 or 190 Uris Hall.

Medieval Studies

Marilyn Migiel, director; B. B. Adams, F. M. Ahl, C. M. Arroyo, R. Brann, K. W. Brazell, E. W. Browne, R. G. Calkins, A. M. Colby-Hall, R. T. Farrell, A. S. Galloway, A. B. Groos, W. E. Harbert, T. D. Hill, P. R. Hyams, J. H. Jasanoff, J. J. John, W. J. Kennedy, N. Kretzmann, J. R. McRae, T. L. Mei, J. M. Najemy, C. A. Peterson, J. R. Piggott, D. S. Powers, D. M. Randel, S. Senderovich, D. R. Shanzer, B. Tierney, W. Wetherbee

Undergraduates interested in Medieval Studies have an opportunity to take courses in the following areas of instruction: medieval Hebrew, Arabic, and Latin; Old English, Middle English, and Old Irish; Old Provençal and medieval French; medieval Spanish and Italian; Old Saxon, Old High German, Middle High German, Gothic, Old Norse (Old Icelandic); Old Russian, and Old Church Slavonic; comparative literature; medieval art and architecture; medieval history; Latin paleography; medieval philosophy; musicology; comparative Slavic linguistics, comparative Romance linguistics, and comparative Germanic linguistics.

Undergraduates who want to undertake an independent major or a concentration in Medieval Studies should consult the director of the program, 259 Goldwin Smith Hall.

Information for prospective graduate students is contained in the catalog of the Graduate School and in a brochure on Medieval Studies, which can be obtained from the director.

Graduate Seminars

Courses in various aspects of medieval studies are offered each year in numerous cooperating departments, including Classics, Comparative Literature, English, History, History of Art, Modern Languages and Linguistics, German Literature, Romance Studies, Russian Literature, Music, Asian Studies, Near Eastern Studies, and Philosophy, and by the Society for the Humanities. An up-to-date listing of the courses offered in each term will be made available at the Medieval Studies office as soon as the Course and Time Roster is published.

Modern European Studies Concentration

Susan Tarrow, coordinator

Students from any college may choose an undergraduate concentration in Modern European Studies to complement any major in any college. The purpose of the concentration is to provide a coherent structure for students with an interest in interdisciplinary study in the field of European studies.

The concentration has three tracks: European politics, economics and society; modern European history; and European culture. The requirements for the concentration are:

1) Competence in at least one modern European language (i.e., completion of a 300-level course or equivalent with a grade of at least B-, or demonstration of an advanced level of competence in an oral proficiency interview test where available).

2) Completion of at least one course in each of the three areas listed below:

a) *European Politics, Society and Economics*

Anthr 350	Anthropology of Europe
Econ 370	Socialist Economies in Transition
Govt 325	Eastern European Politics
Govt 332	Western European Politics
Govt 342	The New Europe
Govt 350	Comparative Revolutions
Soc 366	Transitions from State Socialism

b) *Modern European History*

Hist 242	Europe since 1789 #
Hist 354	Twentieth-Century European Intellectual History
Hist 362	European Cultural History 1815–1870 #
Hist 384	Europe 1945–68
Hist 385	Europe 1968–1992

c) *Humanities*

Any general course dealing with modern Europe (19th and 20th centuries) in one of the following departments: Comparative Literature, English, German Studies, History of Art, Music, Philosophy, Romance Studies, Theatre Arts. Examples of such courses include:

ArtH 260	Introduction to Art History: The Modern Era
ArtH 361	Nineteenth-Century European Art #
COML 202	Great Books
COML 364	The European Novel
Music 108	Bach to Debussy #
Music 274	Opera #
Music 383	Music of the Nineteenth Century #
Phil 212	Modern Philosophy #
Thetr 241	Introduction to Western Theatre II #

Under certain conditions, it may be possible to substitute other courses for those listed above.

3) Three additional courses in any of the three areas.

a) Courses in European and comparative politics, anthropology, sociology, women's studies, and related courses in the School of Hotel Administration, the College of Agriculture and Life Sciences, and the School of Industrial and Labor Relations.

b) Courses in modern European history (post-1789)

c) Course in (post-1789) English and European literatures, comparative literature, semiotics, fine arts, architecture, music, philosophy, film and theatre arts, and women's studies. All concentrators are encouraged to participate in the Language House Program, and to spend a semester or more in a program of study in Europe. Courses taken abroad may be applied to the concentration if they are approved for Cornell credit.

Undergraduates in the College of Arts and Sciences can major in European Studies through the Independent Major or College Scholar programs.

For a list of relevant courses and seminars, departmental advisers, and any further information, contact Susan Tarrow, coordinator of the Modern European Studies Concentration, at the Western Societies Program, 130 Uris Hall (telephone 255-7592).

Religious Studies

B. B. Adams, director; R. Ahmed, C. M. Arroyo, R. A. Baer Jr., J. P. Bishop, R. Brann, R. G. Calkins, C. M. Carmichael, K. Clinton, J. Fajans, J. W. Gair, D. Gold, J. S. Henderson, D. Holmberg, P. R. Hyams, J. J. John, L. H. Kant, C. V. Kaske, S. T. Katz, A. T. Kirsch, N. Kretzmann, J. M. Law, D. Mankin, K. S. March, J. McRae, C. Minkowski, R. L. Moore, D. I. Owen, L. Peirce, J. R. Piggott, D. S. Powers, D. M. Randel, G. Rendsburg, J. S. Rusten, P. S. Sangren, S. Saraydar, D. R. Shanzer, J. T. Siegel, T. A. Sokol, M. Washington, A. Wood

The program in Religious Studies is designed to meet the needs of three classes of students: those seeking interesting courses on religious topics as free electives or to fulfill distribution requirements; those desiring a more systematic exposure to the study of religion as a major component of their liberal arts experience without regard to postgraduate study; and those planning to pursue advanced academic work in religious studies or allied disciplines or subdisciplines (e.g., history of religions, anthropology, religion and literature, religion and psychology, ethics, or theology, as well as certain geographical area studies). To all these students the program offers an opportunity to acquire a fuller understanding and appreciation of one of the most fundamental aspects of human thought and behavior.

The Concentration in Religious Studies

Until May 1994, students in the College of Arts and Sciences may acquire a concentration in Religious Studies by completing an approved program of study that includes at least four courses from the lists below or from updated versions of these lists posted at the Religious Studies office, 309 Rockefeller Hall. Thereafter the concentration will be superseded by the major in Religious Studies.

The Major in Religious Studies

To graduate as a major in Religious Studies a student must (1) complete with letter grades the program's two core courses, Religious Studies 101 (Understanding the Religions of the World) and Religious Studies 449 (History and Methods of the Academic Study of Religion); and (2) complete with letter grades eight additional courses approved for the major, at least four of them at the 300 level or above. The following specifications of this second requirement are designed to promote breadth (2a) and depth (2b) of study.

(2a) At least four of a major's eight additional courses are to be selected to ensure some familiarity with two or more different religions, religious traditions, or religious phenomena. These courses may be at the introductory or advanced levels. For example, "Introduction to Asian Religions" (Asian Studies 250) might lead a student to take "The Religious Traditions of India" (Asian Studies 351), and then to combine these with the two "Medieval Culture" courses (History 365 and 366). Or a student might take four unrelated courses such as "Introduction to the Bible" (Near Eastern Studies/Jewish Studies 223), "Reason and Religion" (Philosophy 263), "Myth, Ritual, and Symbol" (Anthropology 320), and "Islamic History: 1258–1850" (Near Eastern Studies 258) to gain a sense of the range of intellectual activity associated with the academic study of religious traditions and religious practices.

(2b) At least two of these eight additional courses are to be selected to ensure depth of coverage in one religion or one group of closely related religions, religious traditions, or religious phenomena. In the first illustrative case described above, the student might combine "The Religious Traditions of India" with "Indian Meditation Texts" (Asian Studies 460) or "Classical Indian Philosophical Systems" (Asian Studies/Classics 395) to acquire a measure of specialist strength in the religions of India. Alternatively, that student might combine "Introduction to Asian Religions" with one or more courses dealing with Buddhism, such as "Buddhism in China" (Asian Studies 358) or "Japanese Buddhism" (Asian Studies 359), to develop an appropriate depth along a different dimension.

No more than one of the courses chosen to meet requirement 2a may be used to satisfy requirement 2b.

To engage in the kind of focused study envisioned under 2b, a student will be expected to attain proficiency in a language other than English to gain access to relevant sources, primary or secondary. For example, a knowledge of Greek or Latin might be required for the study of Christianity (as well as Greek or Roman religions); of Hebrew or Aramaic for Judaism; of Arabic for Islam; of Sanskrit or Hindi for Hinduism; of Pali or Chinese or Japanese for Buddhism. Religious phenomena like shamanism or totemism, though less firmly rooted in literary traditions, have generated substantial bodies of important scholarship in French and German, and an undergraduate major concentrating in this area of Religious Studies should be equipped to make independent use of such material. Courses used to satisfy this foreign-language proficiency requirement may not be applied to the course requirements described under 2a and 2b.

Most courses approved for the major are offered by cooperating departments within the College of Arts and Sciences; a comprehensive up-to-date list of these courses is maintained at the office of the Religious Studies Program, 309 Rockefeller Hall.

Given the multidisciplinary character of the program in Religious Studies, it is especially important for a prospective major to select a faculty adviser early on. A current list of advisers is available from the program

director. Once an adviser has been selected, a student is expected to prepare a brief statement outlining his or her intended course of major study (including study of an appropriate foreign language) and to file it with the program director for review by the faculty committee responsible for overseeing the program.

The Major with Honors in Religious Studies

To be eligible for honors in Religious Studies, a student must maintain a GPA of 3.0 overall and 3.3 in courses other than language courses used to satisfy requirements for the major. In addition, he or she must enroll in Religious Studies 490 or 491 (Directed Study) and Religious Studies 495 (Honors Thesis), usually in the fall and spring of the senior year, respectively. Each course carries four credits but only the first may be counted as one of the eight additional courses required for the major. Religious Studies 490, 491, and 495 are supervised by cooperating faculty members assigned to individual honors students or small groups of honors students to help them complete substantial independent projects. These projects will be evaluated by the Religious Studies Honors Committee, which is responsible for awarding honors and determining the degree of honors awarded.

Courses Approved for the Major Sponsored by Religious Studies

RELST 101 Understanding the Religions of the World @#
Fall. 3 credits.
M W F 1:25. D. Gold and others.
A team-taught introduction to the contemporary study of religion and the religious traditions of the world. Topics covered include personal piety, mysticism, myth, development of religious institutions, and growth of scriptural canon. Required for majors in Religious Studies.

RELST 260 Knowledge and the Sacred in Small-Scale Societies @
Fall. 3 credits. Enrollment limited to 20.
T R 1:25–2:40. S. Saraydar.
In our quest for ever greater technological sophistication, have we forgotten the sacred knowledge that guided our ancestors? Could this knowledge help us develop a vision of life that reaches beyond the seductive marvels of the industrialized world? We seek to answer such questions by examining religious philosophy and experience in selected small-scale societies of the past and present in North and South America, Australia, Africa, and Asia, with examples from the Navajo, Sioux, Bororo, Aranda, Azande, Zulu, Kung, Chuckchee, Senoi, and other peoples. Comparisons are made with "pagan" religions of Europe as well as contemporary "world" religions.

RELST 449 History and Methods of the Academic Study of Religion
Fall. 4 credits. Prerequisite: completion of or concurrent enrollment in a course (other than a language course) approved for the major in Religious Studies.
T R 1:25–2:40. J. M. Law.
Designed to provide a working familiarity with major methodological issues in the academic study of religion. The first half explores nineteenth-century *Religionswissenschaft* as a nonsectarian, academic approach to religious phenomena and texts. The second half surveys approaches currently in use, with illustrative readings associated with anthropology, hermeneutics, history, history of religions, literary studies, phenomenology, philosophy, sociology, and theology. Required for majors in Religious Studies.

RELST 490–491 Directed Study
490, fall; 491, spring. 2–4 credits each term.
Hours to be arranged. Staff.

RELST 495 Honors Essay
Spring. 4 credits.
Hours to be arranged. Staff.

Courses Approved for the Major Sponsored by Other Units

The following courses offered by cooperating departments are all approved for both the concentration and the major in Religious Studies. For descriptions see the appropriate department listings. It is possible to register for some of these courses under a Religious Studies designation; for details see the program director, Professor Barry Adams, Department of English, 309 Rockefeller Hall.

ANTHR 320 Myth, Ritual, and Symbol @
Spring. 4 credits.
J. Fajans.

ANTHR 322 Magic, Myth, Science, and Religion @
Fall. 4 credits.
A. T. Kirsch.

[ANTHR 428 Spirit Possession, Shamanism, Curing, and Witchcraft @
Spring. 4 credits. Not offered 1992–93.
D. H. Holmberg.]

[ANTHR 443 Religion and Ritual in Chinese Society
Fall. 4 credits. Not offered 1992–93.
P. S. Sangren.]

[ART H 332 Architecture in the Middle Ages #
Fall. 4 credits. Not offered 1992–93.
R. G. Calkins.]

ART H 336 Prelude to the Italian Renaissance #
Fall. 4 credits.
R. G. Calkins.

[ART H 337 The Medieval Illuminated Book #
Fall. 4 credits. Not offered 1992–93.
R. G. Calkins.]

ART H 531 Problems in Medieval Art and Architecture
Fall. 4 credits.
R. G. Calkins.

ASIAN 250 Introduction to Asian Religions @#
Spring. 3 credits.
J. M. Law.

ASIAN 351 The Religious Traditions of India @#
Fall. 4 credits.
D. Gold.

[ASIAN 354 Buddhism in India @#
Spring. 4 credits. Not offered 1992–93. Next offered 1993–94.
J. McRae and C. Minkowski.]

[ASIAN 355 Japanese Religions @
Spring. 4 credits. Not offered 1992–93.
J. M. Law.]

[ASIAN 357 Chinese Religions @#
Fall. 4 credits. Not offered 1992–93.
J. McRae.]

[ASIAN 358 Buddhism in China @#
Fall. 4 credits. Not offered 1992–93.
J. McRae.]

ASIAN 359 Japanese Buddhism @#
Spring. 4 credits.
J. M. Law.

[ASIAN 395 Classical Indian Philosophical Systems
Spring. 4 credits. Not offered 1992–93. Next offered 1993–94.
C. Minkowski.]

[ASIAN 421 Religious Reflections on the Human Body @
Fall. 4 credits. Not offered 1992–93.
J. M. Law.]

[ASIAN 440 Meditation Schools of East Asian Buddhism @#
Spring. 4 credits. Not offered 1992–93.
J. McRae.]

[ASIAN 460 Indian Meditation Texts @#
Fall. 4 credits. Not offered 1992–93.
D. Gold.]

[CLASS 202 The New Testament #
Spring. 3 credits. Not offered 1992–93. Next offered 1993–94.
J. S. Rusten.]

[CLASS 237 Greek Religion and Mystery Cults #
Spring. 3 credits. Not offered 1992–93.
K. Clinton.]

CLASS 333 Greek and Roman Mystery Cults and Early Christianity #
Spring. 4 credits.
K. Clinton.

CLASS 412 Advanced Readings in Latin Literature: Martyrs, Wives, Virgins, Widows: Christian Women of the Later Roman Empire
Spring. 4 credits.
D. R. Shanzer.

[CLASS 468 Augustine's *Confessions* #
Fall. 4 credits. Not offered 1992–93.
D. R. Shanzer.]

[COM L 324 Law and Religion in the Bible #
Fall. 4 credits. Not offered 1992–93.
C. M. Carmichael.]

COM L 326 Christianity and Judaism #
Spring. 4 credits.
C. M. Carmichael.

COM L 328 Literature of the Old Testament @#
Fall. 4 credits.
C. M. Carmichael.

COM L 421 Old Testament Seminar @#
Fall. 4 credits.
C. M. Carmichael.

COM L 426 New Testament Seminar #
Spring. 4 credits.
C. M. Carmichael.

COM L 429 Readings in the New Testament #
Fall. 4 credits.
J. P. Bishop.

HIST 263 The Earlier Middle Ages
Spring. 4 credits.
J. J. John.

[HIST 346 Religion and the Cultural Life of Nineteenth-Century Americans #
4 credits. Not offered 1992–93. Next offered 1993–94.
R. L. Moore.]

[HIST 365 Medieval Culture, 400–1150 #
Spring. 4 credits. Prerequisite: History 263 or instructor's permission. Not offered 1992–93. Next offered 1993–94.
J. J. John.]

HIST 366 Medieval Culture, 1100–1300 #
Spring. 4 credits. Prerequisite: History 264 or instructor's permission.
J. J. John.

HIST 417 Islam in South Asia @#
Fall. 4 credits.
R. Ahmed.

NTRES 407 Religion, Ethics, and the Environment
Spring. 3 credits.
R. A. Baer Jr.

NTRES 611 Seminar in Environmental Ethics
Fall. 3 credits. Open to juniors and seniors with instructor's permission.
R. A. Baer Jr.

NES 197 Introduction to Near Eastern Civilization @#
Fall. 3 credits.
R. Brann.

[NES 198 Introduction to Near Eastern Civilization @#
Spring. 3 credits. Not offered 1992–93.
R. Brann.]

NES 223 Introduction to the Bible @#
Fall. 3 credits.
G. Rendsburg.

[NES 227 Introduction to the Prophets @#
Spring. 3 credits. Not offered 1992–93.
G. Rendsburg.]

NES 228 Genesis @#
Spring. 3 credits.
G. Rendsburg.

NES 234 Muslims, Christians, and Jews in Islamic Spain: Literature and Society @#
Spring. 3 credits.
R. Brann.

[NES 243 History and Archaeology of Ancient Israel @#
Spring. 4 credits. Not offered 1992–93.
D. I. Owen.]

NES 246 Seminar in Jewish Mysticism #
Fall. 3 credits.
S. Katz.

[NES 257 Islamic History: 600–1258 @#
Spring. 3 credits. Not offered 1992–93.
D. Powers.]

NES 258 Islamic History: 1258–1850 @#
Fall. 3 credits.
L. Peirce.

NES 263 Introduction to Biblical History and Archaeology @#
Spring. 3 credits.
D. I. Owen.

[NES 281 Gender and Society in the Muslim Middle East @#
Spring. 3 credits. Not offered 1992–93.
L. Peirce.]

NES 320 Topics in Religion: Religious Symbolism in Near Eastern Late Antiquity @#
Spring. 4 credits.
L. H. Kant.

NES 324 The History of the Early Church: Apostles to Chalcedon
Fall. 3 credits.
L. H. Kant.

NES 348 Varieties of Judaism in the Graeco-Roman World
Spring. 4 credits.
L. H. Kant.

NES 351 Introduction to Islamic Law @#
Spring. 4 credits.
D. Powers.

[NES 418/618 Seminar in Islamic History: Muhammed and the Rise of Islam @#
Spring. 4 credits. Not offered 1992–93.
D. Powers.]

NES 420 Readings in the Hebrew Bible
Fall. 4 credits.
G. Rendsburg.

NES 421 Readings in Biblical Hebrew Poetry
Spring. 4 credits.
G. Rendsburg.

[NES 428 Medieval Hebrew: Biblical Exegesis
Spring. 4 credits. Not offered 1992–93.
R. Brann.]

NES 493 Problems of Ethnicity, Religion, and Interest: Russia, Central Asia, and the Middle East
Fall. 4 credits.
G. Golan.

[NES 627 The Song of Songs
Fall. 4 credits. Graduate level or permission of instructor. Not offered 1992–93.
G. Rendsburg.]

PALI 131–132 Introduction to Pali: The Word of the Buddha
131 fall; 132 spring. 3 credits each term.
J. W. Gair.

PHIL 213 Existentialism
Fall. 4 credits.
A. Wood.

[PHIL 263 Reason and Religion
Fall. 4 credits. Not offered 1992–93.
N. Kretzmann.]

[PHIL 315 Medieval Philosophy
Spring. 4 credits. Not offered 1992–93.
N. Kretzmann.]

[PHIL 415 Special Topics in the History of Philosophy: Aquinas's Moral Theory #
Fall. 4 credits. Not offered 1992–93.
N. Kretzmann.]

Russian/Soviet and East European Studies Major

Janet Mitchell, G. J. Staller (Economics); S. Beck (Field and International Studies Program); I. Ezergailis, D. Bathrick (German Studies); V. Bunce, J. Goldgeier, M. Rush, S. Tarrow (Government); W. M. Pintner (History); U. Bronfenbrenner (emeritus, Human Development and Family Studies); P. Carden, G. Gibian, N. Pollak, M. Scammell, S. Senderovich, G. Shapiro (Russian Literature); W. Browne, R. L. Leed (Slavic linguistics); D. Stark (Sociology).

The major in Russian/Soviet and East European studies has the following requirements:

1) Proficiency in Russian or an East European language with one additional advanced (300-level) language or literature course, **OR** qualification in an East European language **and** qualification in another language useful for research in the area.*

   *These requirements, in the case of some languages, may require study abroad or coursework completed at another institution.

2) At least one course relating to Russia or Eastern Europe, at the 200 level or above, in four of the following five departments: Government, Economics, History, Russian Literature and Sociology. Appropriate courses offered in other departments may be substituted for one of the above courses with the consent of the major adviser.

3) At least three additional courses at the 300 level or above, all from one of the following three departments: Government, History (within the History Department courses may be at the 250 level or above), or Russian Literature. One of the three courses must be at the 400 level or above. The three courses must be approved by the major advisor in the department of concentration.

To apply for the major, students are directed to the Soviet and East European Studies Program, 164 Uris Hall. Students should designate an adviser in the department where his or her work will be concentrated. Students are encouraged to study abroad and should discuss their plans with their advisers. For questions concerning the major or the Honors Program, students should consult with their major adviser or inquire at the Soviet and East European Studies Program.

Honors Program in Russian/Soviet and East European Studies

I. Students entering the Russian/Soviet and East European Studies Major Honors Program must have a cumulative average of at least 3.0, no grade below a B in courses connected with the major, and a cumulative average inside the major of at least 3.5. Each student will form a special honors committee consisting of their major adviser and two other faculty members not necessarily from the Russian/Soviet and East European area.

II. Honors candidates must complete an honors thesis project during the senior year. The topic should be developed and approved in consultation with their major adviser. Part of the research should include sources in Russian or an Eastern European language.

III. Students may earn a total of eight credits for the courses in the honors program and should register for the appropriate number in the department of their major adviser.

IV. Ordinarily, in the first term of the senior year, students who meet the prerequisites will do independent research and reading in a particular area under supervision of their major adviser.

V. In the second term of the senior year students will complete the honors project by a date set by the Soviet and East European Studies Program. Students should keep their committee members informed as their work progresses. Students will meet together with their whole honors committee to discuss the draft of the thesis or project and make recommendations for revision. When the project is completed, the committee will decide whether the project deserves honors, and, if so, after reviewing their academic record, will recommend students for a Bachelor of Arts *cum laude*, *magna cum laude*, or *summa cum laude*. The committee will also assign a grade for the honors research course.

Courses

[CZEC 131–132 Elementary Course
131, fall, 132, spring. 3 credits. Not offered 1992–93.]

[ECON 329 Eastern Europe Today: Economics, Government, Culture (also Government 326 and Russian Literature 329)
Fall. 4 credits. Not offered 1992–93.
G. Staller, M. Rush, G. Gibian.]

[ECON 367/567 Comparative Economic Systems
Fall. 4 credits. Not offered 1992–93.
T R 11:40–12:55. G. Staller.]

[ECON 368 Comparative Economic Systems: Soviet Union and Europe
Spring. 4 credits. Not offered 1992–93.]

ECON 381 Economics of Participation and Worker Management
Fall. 4 credits.
T R 11:40–12:55. J. Vanek.

[ECON 382 The Practice and Implementation of Self-Management
Spring. 4 credits. Not offered 1992–93.
J. Vanek.]

ECON 681 Self-Management
Spring. 4 credits.
To be arranged. J. Vanek.

ECON 682 Seminar on Economics of Participation and Labor-Managed Systems
Fall. 4 credits.
To be arranged. J. Vanek.

[GERST 376 Contemporary Soviet Latvian Literature
Fall. 4 credits. Taught in Latvian. Not offered 1992–93.
I. Ezergailis.]

GOVT 100.8 Power and Politics: The New Eastern Europe
Fall. 4 credits.
T R 11:40–12:55. V. Bunce.

[GOVT 326 Eastern Europe Today: Economics, Government, Culture
4 credits. Not offered 1992–93.]

GOVT 333 Government and Politics of the Soviet Union
Fall. 4 credits.
T R 2:55–4:10. V. Bunce.

[GOVT 337 Marxism, Communism and Revolution
4 credits. Not offered 1992–93.]

[GOVT 359 Soviet Foreign Policy
4 credits. Not offered 1992–93.]

[GOVT 446 Comparative Communism
Spring. 4 credits. Not offered 1992–93.
W 2:30–4:30. M. Rush.]

[GOVT 481 Foreign Policy of the U.S.S.R.
Spring. 4 credits. Not offered 1992–93.
W 1:25–3:20. J. Goldgeier.]

[GOVT 486 International Security: Soviet Security Policy
4 credits. Not offered 1992–93.]

[GOVT 491 Superpower Security and Third World Conflicts
4 credits. Not offered 1992–93.]

[GOVT 639 Politics of the Soviet Union
Fall. 4 credits. Not offered 1992–93.
W 2:30–4:30. M. Rush.]

[GOVT 657 Comparative Democratic Transitions
Spring. 4 credits. Not offered 1992–93.
R 3:35–5:35. V. Bunce and S. Tarrow.]

[GOVT 669 Modern Social Theory I
4 credits. Not offered 1992–93.]

[GOVT 670 Modern Social Theory II
4 credits. Not offered 1992–93.]

HIST 218 The Russian Military Effort and Foreign Policy #
Fall. 3 credits.
W 12:20–2:15. W. Pintner.

HIST 252 Russian History to 1800 #
Fall. 4 credits.
T R 10:10–11:25. W. Pintner.

[HIST 253 Russian History Since 1800 #
Spring. 4 credits. Not offered 1992–93.
W. M. Pintner.]

[HIST 471 Russian Social History
Spring. 4 credits. Not offered 1992–93.
W. M. Pintner.]

[HIST 486 The Formation of the Russian Intelligentsia, 1700–1850
Fall. 4 credits. Not offered 1992–93.
W. M. Pintner.]

[HIST 677 Seminar in Russian History
Fall. 4 credits. Not offered 1992–93.
W 12:20–2:20. W. M. Pintner.]

HDFS/FISP 400 Families and Cross-Cultural Perspectives
Fall. 3 credits.

[HDFS 488 (also Psychology 488) Development in Context
Spring. 4 credits. Not offered 1992–93.
U. Bronfenbrenner.]

[HUNG 131–132 Elementary Course
3 credits. Not offered 1992–93.]

NBA 583 Market Transitions in Eastern Europe
Fall. 3 credits.

[MUSIC 668 Shostakovich's Twenty-Four Preludes and Fugues
4 credits. Not offered 1992–93.]

[POLSH 131–132 Elementary Course
131, fall; 132, spring. 3 credits each term. Not offered 1992–93.
W. Browne.]

[POLSH 133–134 Intermediate Course
133, fall; 134, spring. 3 credits each term. Not offered 1992–93.
Staff.]

[RUM 131–132 Elementary Course
Fall and spring. 3 credits. Not offered 1992–93.]

[RUSSA 101–102 Elementary Course
101, fall; 102, spring. 6 credits each term. Not offered 1992–93.
R. L. Leed and staff.]

RUSSL 103 Freshman Writing Seminar: Classics of Russian Thought and Literature
Fall or spring. 3 credits.
Staff.

RUSSL 104 Freshman Writing Seminar: Nineteenth-Century Russian Literary Masterpieces
Fall or spring. 3 credits.
Staff.

RUSSL 105 Freshman Writing Seminar: Twentieth-Century Russian Literary Masterpieces
Fall or spring. 3 credits.
Staff.

[RUSSL 108 Freshman Writing Seminar
Fall or spring. 3 credits. Not offered 1992–93.
Staff.]

RUSSA 121–122 Elementary Course
121, fall; 122, spring. 4 credits each term.
S. Paperno and staff.

RUSSA 123 Continuing Russian
Fall or summer. 4 credits.
Staff.

RUSSL 201–202 Readings in Russian Literature #
201, fall; 202, spring; N. Pollak, G. Shapiro.
3 credits each term.

RUSSA 203–204 Intermediate Composition and Conversation
203, fall or spring; 204, spring. 3 credits each term.
L. Paperno and S. Paperno.

RUSSA 205–206 Translating Russian Newspapers
205, fall; 206, spring. 2 credits each term.
S. Paperno.

[RUSSL 207 Themes from Russian Culture I #
Fall. 3 credits. Not offered 1992–93.
M W F 1:25. G. Shapiro.]

RUSSL 208 Themes from Russian Culture II
Spring. 3 credits.
M W F 1:25. G. Shapiro.

RUSSA 301–302 Advanced Russian Grammar and Reading
Staff.

RUSSA 303–304 Advanced Composition and Conversation
303, fall; 304, spring. 4 credits each term.
L. Paperno and S. Paperno.

RUSSA 305–306 Directed Individual Study
305, fall; 306, spring. 2 credits.
Staff.

[RUSSL 329 Eastern Europe Today: Economics, Government, Culture (also Economics 329 and Government 326)
Fall. 4 credits. Not offered 1992–93.
G. Gibian, M. Rush, G. Staller.]

[RUSSL 330 The Soviet Union: Politics, Economics, and Culture (also Economics 330 and Government 330)
Spring. 4 credits. Not offered 1992–93.
T R 2:55–4:10. G. Gibian, M. Rush, G. Staller.]

RUSSL 331 Introduction to Russian Poetry #
Fall. 4 credits.
T R 1:25–2:40. S. Senderovich.

RUSSL 332 Russian Drama and Theatre (also Theatre Arts 332)
Fall. 4 credits.
T R 1:25–2:40. S. Senderovich.

[RUSSL 333 Twentieth-Century Poetry
Spring. 4 credits. Not offered 1992–93.
T R 11:40–12:55. N. Pollak.]

[RUSSL 334 The Russian Short Story #
Spring. 4 credits. Not offered 1992–93.
T R 1:25–2:40. M. Scammell.]

[RUSSL 335 Gogol #
Spring. 4 credits. Not offered 1992–93.
Staff.]

RUSSL 350 Education and the Western Literary Tradition (also Comparative Literature 350 and College Scholar 350) #
Spring. 4 credits.
P. Carden.

[RUSSL 367 The Russian Novel #
Spring. 4 credits. Not offered 1992–93.
T R 10:10–11:25. G. Gibian.]

[RUSSL 368 Soviet Literature from Revolutionary Times to "Glasnost"
Fall. 4 credits. Not offered 1992–93.
T R 1:25–2:40. M. Scammell.]

[RUSSL 371 Literature of the Third Wave
Spring. 4 credits. Not offered 1992–93.
M. Scammell.]

RUSSL 373 Chekhov in the Context of Contemporary European Literature and Art (also CompL 395) #
Fall. 4 credits.
S. Senderovich.

[RUSSL 375 Literature of the Soviet Period 1917–1945
Fall. 4 credits. Not offered 1992–93.
M. Scammell.]

[RUSSL 376 Literature of the Soviet Period 1945–1985
Spring. 4 credits. Not offered 1992–93.
M. Scammell.]

RUSSL 380 Soviet Dissident Literature
Fall. 4 credits.
T R 1:25–2:40. M. Scammell.

RUSSL 385 Reading Nobokov (also CompL 385 and English 379)
Spring. 4 credits.
M W F 2:30. G. Shapiro.

[RUSSL 388 Ideas and Form in Novels of Social Inquiry (also Comparative Literature 388)
Spring. 4 credits. Not offered 1992–93.
G. Gibian.]

[RUSSL 389 Modern Literature in Poland, Czechoslovakia, Hungary and Yugoslavia
4 credits. Not offered 1992–93.]

[RUSSL 390 The Power of Nationalism: Expressions of National Feelings in Politics, Literature, History, and the Arts (also Comparative Literature 390)
Fall. 4 credits. Not offered 1992–93.
G. Gibian and others.]

RUSSL 393 Honors Essay Tutorial
Fall or spring. 4 credits each term.
Staff.

[RUSSL 400 Reading the Great Tradition #
Fall. 4 credits. Not offered 1992–93.
T R 1:25–2:40. S. Senderovich.]

[RUSSA 401–402 History of the Russian Language
401, fall; 402, spring. 4 credits each term. Not offered 1992–93.
Staff.]

[RUSSA 403–404 Linguistic Structure of Russian
403, fall; 404, spring. 4 credits. Not offered 1992–93.
Staff.]

[RUSSA 407 Russian for Teachers
4 credits. Not offered 1992–93.]

[RUSSL 409 Russian Stylistics
Fall. 4 credits. Not offered 1992–93.
S. Senderovich.]

RUSSA 413–414 Advanced Conversation and Stylistics
413, fall; 414, spring. 4 credits each term.
T R 3:35–4:25. L. Paperno and S. Paperno.

RUSSL 431 Contemporary Russian Prose
Spring. 4 credits.
T R 11:40–12:55. G. Gibian.

[RUSSL 432 Pushkin #
Spring. 4 credits. Not offered 1992–93.
T R 11:40–12:55. G. Gibian.]

RUSSL 491 Reading Course: Russian Literature in the Original Language
Fall or spring. 1 credit.
Staff.

RUSSL 492 Supervised Reading in Russian Literature
Fall or spring. 1–4 credits each term.
Hours to be arranged. Staff.

[RUSSL 600 Proseminar: Research Methodology in Russian Literature
Fall. 4 credits. Not offered 1992–93.
P. Carden.]

RUSSA 601 Old Church Slavic
Fall. 4 credits.
M W F 10:10. E. W. Browne.

RUSSA 602 Old Russian
Fall. 4 credits.
Staff.

[RUSSL 603 Graduate Seminar: Neglected Masterpieces of Short Russian Prose
Spring. 4 credits. Not offered 1992–93.
T R 2:55–4:10. G. Gibian.]

RUSSL 611 Supervised Reading and Research
Fall or spring. 2–4 credits.
Staff.

[RUSSL 619 Seventeenth-Century Russian Literature
Fall. 4 credits. Not offered 1992–93.
W 3:35–5:35. G. Shapiro.]

[RUSSL 620 Twentieth-Century Russian Poetry
Spring. 4 credits. Not offered 1992–93.
N. Pollak.]

[RUSSL 621 Old Russian Literature
Spring. 4 credits. Not offered 1992–93.
T 4:15–6:15. S. Senderovich.]

RUSSL 622 Eighteenth-Century Russian Literature
Spring. 4 credits.
T 4:15–6:15. S. Senderovich.

[RUSSL 624 Russian Romanticism
Fall. 4 credits. Not offered 1992–93.
R 4:15–6:15. S. Senderovich.]

[RUSSL 625 Russian Realism
Spring. 4 credits. Also open to advanced undergraduates with permission of instructor. Not offered 1992–93.
W 3:35–5:35. P. Carden.]

[RUSSL 626 The Tradition of Russian Poetry
Spring. 4 credits. Not offered 1992–93.
F 2:30–4:30. N. Pollak.]

RUSSL 632 Russian Drama and Literature (also Theatre Arts 632)
Fall. 4 credits.
T R 1:25–2:40. S. Senderovich.

RUSSA 633–634 Russian for Graduate Specialists
633, fall; 634, spring. 4 credits each term.
L. Paperno and S. Paperno.

[RUSSL 635 Modern Russian Literary Criticism
Fall. 4 credits. Not offered 1992–93.
W 3:35–5:35. P. Carden.]

RUSSA 651–652 Comparative Slavic Linguistics
651, fall; 652, spring. 4 credits each term.
E. W. Browne.

[RUSSL 669 Seminar: Dostoevsky
Fall. 4 credits. Not offered 1992–93.
G. Gibian.]

[RUSSL 671 Seminar in Nineteenth-Century Russian Literature
Fall. 4 credits. Not offered 1992–93.
T 4:15. G. Gibian.]

RUSSL 672 Seminar in Twentieth-Century Russian Literature
Fall. 4 credits.
M 4:30–6:30. N. Pollak.

[RUSSL 673 The Russian Nabokov
Fall. 4 credits. Not offered 1992–93. Also open to advanced undergraduates.
R 4:15–6:15. M. Scammell.]

RUSSL 674 Solzhenitsyn and Literature of the Gulag
Fall. 4 credits.
M. Scammell.

RUSSL 675 Russian Literature, 1917–1945
Fall. 4 credits.
F 2:30–4:30. G. Shapiro.

RUSSL 676 Russian Literature, 1945–Present
Spring. 4 credits.
R 4:15–6:15. G. Gibian.

SEBCR 131–132 Elementary Course
131, fall; 132, spring. 3 credits each term.
Staff.

SEBCR 133–134 Intermediate Course
133, fall; 134, spring. 3 credits each term.
Staff.

[SOC 365 Comparative Perspectives on Socialist Societies and Economics
4 credits. Not offered 1992–93.]

[SOC 366 Socialist Societies Today
Spring. 4 credits. Not offered 1992–93.
T R 11:40–12:55. D. Stark.]

[THETR 378 Russian Films of the 1920s and French Films of the 1960s
4 credits. Not offered 1992–93.]

[UKR 131–132 Elementary Course
131, fall; 132, spring. 3 credits each term. Not offered 1992–93.
W. Browne.]

Science and Technology Studies Major

(History, Philosophy, Sociology, and Politics of Science and Technology)

S. Jasanoff, chair, R. N. Boyd, S. M. Brown Jr., emeritus, P. R. Dear, P. N. Edwards, J. P. Jarrett, R. R. Kline, B. V. Lewenstein, W. R. Lynn, R. W. Miller, T. J. Pinch, A. G. Power, M. W. Rossiter, P. J. Taylor, L. P. Williams. Adjunct faculty: S. R. Barley, J. J. Brumberg, J. F. MacDonald, W. B. Provine, J. V. Reppy, Z. Warhaft

Science and technology profoundly affect our lives, often in ways we scarcely understand or perceive. The study of their historical formation, their conceptual structure and social organization, and their political and policy implications can yield important insights into the nature of the modern world.

Whether one looks at the history of quantum mechanics, the philosophy of evolution, the sociology of laboratory experiments, or the policy options for environmental protection, one learns about science and society by engaging in the study of both. None of the different dimensions of science and technology makes sense on its own; their integration is increasingly necessary in the worlds of research as well as teaching. The Department of Science and Technology Studies provides a focus for such work at Cornell.

The department administers two majors. The major in Science and Technology Studies aims to further students' understanding of the social and cultural meaning of science and technology and their ability to participate meaningfully in policy debates. Students may focus on the historical, philosophical, sociological, or political aspects of science and technology, within an overall plan aimed at providing a full appreciation of the place of science and technology in society. Students in the sciences or engineering also have the option of taking Science and Technology Studies as a minor or double major. Information may be obtained from the Biology and Society office, 275 Clark Hall, 255-6042.

The Biology and Society major is designed for students who desire strong training in biology and who also wish to acquire a background in the social, political, and ethical dimensions of the biological sciences. The undergraduate curriculum in biology and society is a major in the College of Arts and Sciences and in the College of Human Ecology. It is also offered as an optional curriculum for undergraduates entering the General Studies Program of the New York State College of Agriculture and Life Sciences. A full description of the Biology and Society Major may be found in the section on Special Programs and Interdisciplinary Studies. Information and application materials may be obtained from the Biology and Society office, 275 Clark Hall (255-6042).

The Science and Technology Studies Major

Prerequisites: Students intending to major in Science and Technology Studies will be required to complete the following courses before declaration of the major: i) two introductory courses such as Science and Technology Studies 151–152 (Introduction to Western Civilization) (also History 151–152), Philosophy 211 (Ancient Philosophy), or Philosophy 212 (Modern Philosophy). They may also use more advanced courses approved by the student's adviser; ii) the science requirement of the College of Arts and Sciences; iii) mathematics or computer science courses in fulfillment of the Group Four distribution requirement.

Core Courses: Science and Technology Studies majors will be required to take:

(i) either Science and Technology Studies 250 (Technology in Western Society) or Science and Technology Studies 282 (Science in Western Civilization); and

(ii) either Science and Technology Studies 381 (Philosophy of Science: Knowledge and Objectivity) or Science and Technology 389 (Philosophy of Science: Evidence and Explanation); and

(iii) Science and Technology Studies 415 (Politics of Technical Decisions) or Science and Technology Studies 442 (Sociology of Science)

Other Science and Technology Studies Courses: Science and Technology Studies majors will be required to complete at least 21 credit hours of additional courses in Science and Technology Studies, subject to the following restrictions:

(i) Breadth requirement: At least one course beyond the core courses in each of the three areas of concentration (history, philosophy, and social studies of science and technology);

(ii) Depth requirement: At least two courses in one area beyond the core courses and intended for advanced undergraduates or graduate students.

Additional Science Requirement: In addition to the science requirement of the College of Arts and Sciences, Science and Technology Studies majors are required to take an additional two semesters of a natural science or engineering (including computer science). Mathematics sufficient to follow the additional science requirement should be completed before undertaking that requirement. Choice of these courses should be made in consultation with the students' major advisers.

Course Offerings

History
Philosophy
Social Studies of Science
Independent Study

History

S&TS 151 Introduction to Western Civilization (also History 151)
Fall. 4 credits.
T R 10:10–11:25, plus one disc section per week. B. Strauss.
History 151 deals with the political, social, economic, cultural, and intellectual development of Europe and the Ancient Middle East from the dawn of civilization to the Renaissance. Readings are selected from original sources (in translation) and accounts by modern historians.

S&TS 152 Introduction to Western Civilization (1600 to the end of World War II) (also History 152)
Spring. 4 credits.
T R 8:40–10:00; disc to be arranged.
L. P. Williams.
This course treats the political, social, economic, and intellectual developments of Western Civilization from the Renaissance to the end of World War II. Students will read a number of novels as well as original and secondary sources to illustrate these developments.

S&TS 233 Agriculture, History, and Society: From Squanto to Biotechnology (also History 233)
Fall. 4 credits.
M W 12:20–1:10, disc to be arranged.
M. W. Rossiter.
This course will survey the major themes in the development of agriculture and agribusiness in the United States in the nineteenth and twentieth centuries. These include particular individuals (such as Liberty Hyde Bailey, Luther Burbank, G. W. Carver, Henry A. Wallace, and Norman Borlaug), the rise of government support and institutions (including U.S.D.A. and Cornell), noteworthy events (the Dust Bowl, World War II, and the environmental movement), and the achievements of the recent Green and "Gene" Revolutions.

S&TS 250 Technology in Western Society (also Engineering 250)
Fall. 3 credits.
M W F 12:20. R. Kline.
An examination of the interaction between technology and Western society from the earliest times to the present, focusing on Western Europe up to the British industrial revolution in the late eighteenth century, and on the United States thereafter. Topics include the economic and social aspects of industrialization; the myths of heroic inventors such as Morse, Edison, and Ford; the government's promotion and regulation of technology through such measures as the patent system, the funding of research and development, and regulatory legislation; the origins of modern systems of mass production; and the spread of the automobile and microelectronics cultures in the United States.

S&TS 281 Science in Western Civilization (also History 281) #
Fall. 4 credits. S&TS 281 is not a prerequisite to 282.
T R 11:40–12:55 plus disc to be arranged.
P. R. Dear.
These courses aim to make comprehensible, both to science majors and to students of the humanities, the historical structure and development of modern science and to show science as a cultural phenomenon. Changing perceptions of nature and human knowledge from Greek antiquity to the twentieth century

form the framework for current Western views of the world, while the roots of the present-day dominance of "science" as a symbol of progress and modernity lie in an alliance between knowledge of nature and power over nature that took shape in the nineteenth century after a long period of emergence. 281 runs chronologically up to the death of Isaac Newton and focuses on the cultural traditions of Christian Europe and its selective appropriation of a Greek heritage; 282 covers the eighteenth, nineteenth, and early twentieth centuries.

[S&TS 282 Science in Western Civilization (also History 282) #
Spring. 4 credits. Next offered spring 1994.
P. R. Dear.]

S&TS 287 Evolution (also Biological Sciences 207 and History 287)
Fall. 3 credits.
T R 10:10–11. Disc to be arranged.
W. B. Provine.
Evolution is the most central concept in biology. This course examines evolution in historical and cultural context. Aims of the course include understanding of the major issues in the history and current status of evolutionary biology, and exploration of the implications of evolution for culture. Issues range from controversies over mechanisms of evolution in natural populations to the conflict between creationists and evolutionists.

S&TS 288 History of Biology (also Biological Sciences 202, Biology and Society 288, and History 288)
Spring. 3 credits. Prerequisite: one year of introductory biology.
W. B. Provine.
An examination of the history of biology, emphasizing the interaction of biology and culture. Original writings of biologists constitute the bulk of reading assignments. This course covers the period from Classical antiquity to the present, but primary emphasis is on twentieth-century biology.

S&TS 292 The Electrical and Electronic Revolutions (also Electrical Engineering 292)
Spring. 3 credits.
R. Kline.
The course investigates the history of electricity in society from 1830 to the present by considering the technical and social history of telecommunications, the electric power industry, microelectronics, radio, television, and computers. Emphasis is placed on the changing relationship between science and technology, the institutional context of research and development, the economic aspects of innovation, and the social implications of this technology.

S&TS 433 Comparative History of Science (also History 433)
Spring. 4 credits.
M. W. Rossiter.
A survey of the major scientific institutions in foreign nations, including developing countries. The course covers the period 1660 to the present and gives some attention to who in each country becomes a scientist, who rises to the top, and who emigrates. Weekly readings and a research paper.

S&TS 444 Historical Issues of Gender and Science (also History 444 and Women's Studies 444)
Spring. 4 credits. Open to sophomores.
M. W. Rossiter.
One-semester survey of women's role in science and engineering from antiquity to the 1980s, with special emphasis on the United States in the twentieth century. Readings will include biographies and autobiographies of prominent women scientists, educational writings and other primary sources, and recent historical and sociological studies. By the end of the semester, we shall have attained a broad view of the problems that have faced women entering science and those that still remain.

[S&TS 447–448 Seminar in the History of Biology (also Biology and Society 401–402 and History 447–448)
4 credits. Not offered 1992–93.
W. Provine.]

[S&TS 465 Scientific Rhetoric in Historical Perspective (also History 465 and Communication 465)
Spring. 4 credits. No prerequisites.
P. R. Dear, B. Lewenstein.]

[S&TS 482 The Origins of Modern Science 1500–1700 (also History 482) #
Spring. 4 credits.
P. R. Dear.]

[S&TS 487 Science, Technology, and Strategy in the Post-Napoleonic World (also History 487)
Spring. 4 credits.
L. P. Williams.]

S&TS 488 The Golden Age of French Sciences: 1789–1830 (also History 488)
Spring. 4 credits.
L. P. Williams.
In 1789, Antoine Laurent Laviosier published his great *Elementary Treatise on Chemistry*, which created modern chemistry. In 1827, Pierre Simon de Laplace died. In between, such great French scientists as Lamarck, Cuvier, Ampere, Poisson, Biot, Bichat, Cabanis, and Pinel did their most important work. This seminar will deal with their original texts.

S&TS 525 Seminar in the History of Technology
Fall. 4 credits (pending EPC approval).
R 2:30–4:30. R. R. Kline.
Exploration of the history of technology in Europe and the United States from the eighteenth century to the present. Typical topics include the industrial revolution in Britain, the emergence of engineering as a profession, military support of technological change, labor and technology, the "incorporation" of science and engineering, technological utopias, cultural myths of engineers and inventors, social aspects of urbanization in the city and on the farm, post-war consumerism, and gender and technology. The interests of students and recent literature in the field will be considered in selecting the topics for the seminar.

S&TS 680 Seminar in Historiographical Approaches to Sciences (also History 680)
Fall. 4 credits.
T 2:30–4:30. P. R. Dear.
Examines philosophical, sociological, and methodological dimensions of recent historiography of science.

[S&TS 682 Seminar in the History of Nineteenth-Century Physical Science (also History 681)
Fall. 4 credits.
L. P. Williams.]

S&TS 687 Seminar in the History of Agricultural Sciences (also History 687)
Fall. 4 credits. Permission of instructor required.
Hours to be arranged. M. W. Rossiter.
Weekly readings and a research paper.

[S&TS 781 Advanced Seminar in the History of Nineteenth-Century Physical Science (also History 781)
Fall and spring. 4 credits each term.
Prerequisite: permission of instructor.
L. P. Williams.]

Philosophy

S&TS 286 Science and Human Nature (also Philosophy 286)
Spring. 4 credits.
R. N. Boyd, N. Sturgeon.
An examination of attempts in the biological and social sciences to offer scientific theories of human nature and human potential and to apply such theories to explain important social and psychological phenomena. Topics vary, and may include issues in psychology, such as behaviorism, Freudianism, and artificial intelligence, or issues in the foundations of historical theory, such as methodological individualism and economic determinism, as well as relevant issues in the biological sciences. Topics for 1993: Darwin, social Darwinism, and sociobiology.

S&TS 381 Philosophy of Science: Knowledge and Objectivity (also Philosophy 381)
Fall. 4 credits.
M 7:30–10 p.m., plus discussion.
R. N. Boyd.
An examination of central epistemological and metaphysical issues raised by scientific theorizing: the nature of evidence; scientific objectivity; the nature of theories, models, and paradigms; and the character of scientific revolutions. In addition to the contemporary literature in the philosophy of science, readings are also drawn from the history of science and from the works of classical modern philosophers such as Locke, Hume, and Descartes.

S&TS 384 Philosophy of Physics (also Philosophy 384)
Fall. 4 credits.
M W F 1:25. J. P. Jarrett.
An introduction to issues arising in a philosophical examination of modern physical science. Relevant aspects of classical statistical mechanics, relativity theory, and quantum mechanics will be considered in connection with such topics as microphysical indeterminateness, probabilistic laws, causality, the direction of time, action-at-a-distance, and scientific explanation.

[S&TS 389 Philosophy of Science: Evidence and Explanation (also Philosophy 389)
Spring.
R. W. Miller.]

S&TS 472 Biology and Philosophy
Spring. 4 credits.
D. Allchin.

[S&TS 481 Problems in the Philosophy of Science (also Philosophy 481)
Spring. 4 credits. Not offered 1992–93.
J. P. Jarrett.
A study of the logical and conceptual structure of quantum mechanics. Topics to be discussed include Heisenberg's Principle, complementarity and the Copenhagen Interpretation, quantum logic, the measurement problem, the "paradoxes" (Schrödinger's cat, Wigner's friend, the EPR argument), Bell's Theorem, and the Everett-Wheeler ("many worlds") Interpretation. Some previous training in physics or mathematics is recommended, but no specialized background will be presupposed. The course will attempt to provide a philosophically responsible account of the structure of quantum mechanics in a way that fosters insight into the reasons certain aspects of the theory remain controversial.]

S&TS 661 Reason, Truth, and Science (also Philosophy 661)
Spring. 4 credits.
Sem, W 4:30–6:30. R. Miller.
This seminar will discuss recent work on truth, rationality, and objectivity, including the work of Hilary Putnam. We will look at some leading current discussions of what makes a belief rational, what determines its content, what is involved in asserting its truth, and the implications of each of these questions for our access to mind-independent facts. These investigations will include current responses to scientific realism, especially recent efforts to reject both realism and anti-realism as these positions are standardly conceived. (Open to advanced undergraduates.)

[S&TS 681 Philosophy of Science (also Philosophy 681)
4 credits. Not offered 1992–93.
Topics will vary.]

Social Studies of Science

S&TS 110 FWS: Looking for the Scientific Method
Spring. 3 credits.
S. Sismondo.
This course explores attempts to answer the question, "What, if anything, is the scientific method?" The first part of the course is a selective history of philosophical characterizations of the scientific method. It focuses on controversies, thereby drawing out some of the key issues. Some of the philosophical authors we read include Francis Bacon, Karl Popper, Hilary Putnam, Thomas Kuhn, and Paul Feyerabend. In addition to the philosophical tradition, the course will look at some challenges from outside that history, challenges that come from feminist scholars and sociologists of science. We will ask whether there can be a distinctively feminist scientific method, and if so, what it would look like. Authors considered include Sandra Harding, Evelyn Fox Keller, and Bruno Latour.

S&TS 114 FWS: Ecology and Social Change (also Biology and Society 114)
Spring. 3 credits.
P. Taylor.
The central question of this seminar is: What ecological and social principles can guide our interventions within nature? We examine fundamental ecological ideas and the ways they have been drawn into discussions of social change. Through written assignments, students are encouraged to work the ideas into their own thinking.

S&TS 167 FWS: Science in and out of Lab (also Biology and Society 167)
Fall. 3 credits.
T R 2:55–4:10. S. Allison.
This course will be about scientific knowledge, particularly biological knowledge, and some of the images and tools it creates. In the first weeks we look at a few things that philosophers have said about scientific knowledge and set up some frameworks and questions for the rest of the course. Does scientific knowledge reflect nature or interact with it? Are there other opinions? In the remainder of the course we look at some scientific papers and case studies by historians, sociologists, and philosophers, using in a concrete way some of the philosophical distinctions we start out with.

S&TS 181 Engineering in Context (also Engineering 181)
Fall. 3 credits.
TBA. R. Kline and R. Lance.

S&TS 324 Environment and Society (also Rural Sociology 324)
Fall. 3 credits.
M W F 1:25. Staff.
Explores various sociological approaches to the study of society and its physical environment and analyzes major contemporary environmental issues from a sociological viewpoint. Among the major topics treated are world population growth, energy and environmental policy, the world food crisis, the limits to growth debate, the impacts of technological and social change in agriculture on environmental quality, global warming, sustainable development, genetic resources conservation, and topical deforestation.

S&TS 327 Computers and Society
Fall. 4 credits.
M W F 2:30–3:20. Staff.
The computer has facilitated massive changes in American society. In the workplace, computers have been applied to data processing, robotics, machine tools, automated design, and expert systems. This course explores the social role of computers, emphasizing the complex interactions of political, economic, and cultural forces with technology. Nontechnical.

S&TS 352 Science Writing for the Mass Media (also Communication 352)
Fall. 3 credits. Not open to freshmen. Limited to 25 students. Prerequisite: one college writing course.
Lecs, M W F 9:05. B. V. Lewenstein.
How to cover science (including technology and medicine) for the mass media. Discussion topics include accuracy, simplicity, comprehensiveness, scientific literacy, risk communication, and the history and social structure of science. Weekly writing assignments focus on writing news and feature stories for newspapers and magazines, with excursions into newsletters, radio, TV, and other media.

S&TS 360 Ethical Issues in Engineering (also Engineering 360)
Spring. 3 credits. Open to juniors and seniors.
3 lecs. R. R. Kline.
A discussion of ethical issues encountered in engineering practice, such as the rights of engineers in corporations, responsibility for harmful actions, whistleblowing, conflicts of interest, and decision making based on cost-benefit analysis. Use of codes of ethics of professional engineering societies and ethical theory to help sort conflicting obligations the engineer may feel toward public safety, professional standards, employers, colleagues, and family. Students will present a case study to the class, along the lines of the Space-Shuttle Challenger disaster, the Kansas City Hyatt-Regency Hotel walkway failure, or the Cornell computer "worm."

S&TS 400 Components and Systems: Engineering in a Social Context (also Mechanical and Aerospace Engineering 400)
Spring. 3 credits. Open to junior-level (and more advanced) students in the physical sciences and engineering areas.
Z. Warhaft.
This course will address, at a technical level, broader questions than are normally posed in the traditional engineering/physics curriculum. Through a series of case studies we will investigate the various interactions between the scientific, technical, political, economic, and social forces that are involved in the development of engineering systems. A central theme will be to contrast the micro and macro aspects of engineering. Much technical education is involved with the components (gears, turbines, integrated circuits) rather than with the system as a whole (the aerospace plane, power stations, ballistic missile defense) and here we will show that new issues, even at the purely technical level, arise as components are built up into systems. Some dichotomies to be explored will be pure vs. applied science, non-military vs. military technology and independent vs. biased decision making and we will discuss how these have been blurred in recent years.

S&TS 401 Biology and Society: The Social Construction of Life (also Biology and Society 301 and Biological Sciences 301)
Fall. 4 credits. Prerequisite: one year of introductory biology. Limited to 75 students.
M W 2:30–4:25. P. J. Taylor.
Controversial issues, past and present, in the life sciences and tools for analysis of the social, historical, and conceptual underpinnings of these issues. Topics include evolution and natural selection, heredity and genetic determinism, biotechnology and reproductive interventions, ecology and environmental change. Analytic themes include bias, metaphor, historical semantics, styles of explanation, determinism, causality, interest, social construction, and gender. Through discussions and writing assignments, students will develop analytic skills and their own responses to current issues.

[S&TS 402 Investigative Research on the Social Impact of Science (also Biology and Society 300, Textiles and Apparel 301)
Spring. 4 credits. Prerequisite: one year of science and prior consultation with the instructors. Not offered 1992–93.
P. J. Taylor and P. Schwartz.]

S&TS 406 Biotechnology and Law (also Biology and Society 406)
Fall. 4 credits. Limited to 16 students. Recommended: a course in genetics or rDNA, a course in American government or law, or permission of instructor. Fee for course reading material.
T 2:30–4:30. S. Jasanoff.
Biotechnology, with myriad applications in areas such as medicine and agriculture, is developing more rapidly than the social institutions that are capable of controlling it.

This course explores the use and potential abuse of biotechnology in areas such as genetic screening and counseling, reproductive technologies, intentional release of genetically engineered organisms, patents, and ownership of human tissue. Particular attention will be given to evolving legal and management strategies for regulating the applications of biotechnology. Readings are from science, medicine, law, and public policy. A research paper is required.

S&TS 407 Law, Science and Public Values (also Government 407 and Biology and Society 407)

Fall. 4 credits.
M W F 1:25–2:15. S. Jasanoff.
This course explores the varied interactions between science and the legal process that have developed in recent years as a result of attempts to bring greater public accountability to the use of science and technology. It examines the activities of both legislatures and courts in controlling science and analyzes the values underlying these initiatives. Three major types of science-law interactions form the focus of the course: regulation of new technologies, judicial review of risk-management decisions, and legal control of professional standards in science and technology. Specific topics include the regulation of toxic chemicals and nuclear power, controversies about biotechnology, reproductive technologies and biomedical research, and scientific misconduct.

S&TS 415 The Politics of Technical Decisions (also City and Regional Planning 541 and Government 628)

Fall. 4 credits.
T R 1:25–2:40. M. Dennis.
Political and social aspects of decision making in technical areas. Examines the historical origins and characteristics of "technical politics," the role of experts in government, and the problem of expertise in a democratic system. Explores the politics and social dimensions of artifacts and cultures as well as government.

[S&TS 427 Environmental Risk and Public Policy (also Government 427)

Fall. 4 credits. Limited enrollment.
S. Jasanoff. Next offered 1993–94.
This course provides an introduction to the problem of incorporating scientific and technical information into legal and political decisions about environmental risk. Readings from law, anthropology, political science, and policy analysis include works dealing with the nature of technology and scientific uncertainty, the interplay of facts and values in risk assessment, the influence of culture on the interpretation of evidence, the political role of experts, and public participation in technical decisions. The course will evaluate major theoretical frameworks for explaining the relationship between science and environmental policy (e.g., technological determinism, social constructivism) and will assess alternative approaches to improving policymaking based on science.]

S&TS 432 Minds, Machines, and Subjectivity

Spring. 4 credits.
Staff.
Can computers think? Are people machines? How has the idea that the mind is a computer influenced human self-understanding? The multi-leveled approach of this course traces the history and function of cultural productions centered around computing. It attempts to include science, engineering, and fictional representations together under the rubric of a "discourse" of information machines as metaphors for the mind. Course materials include readings drawn widely from artificial intelligence, philosophy of mind, cognitive science, ethnographies of computer cultures such as hackers and child programmers, and science fiction. A series of films is screened, and students are encouraged to explore the meaning of computer metaphors through creative work as well as analysis and research.

S&TS 442 The Sociology of Science (also City and Regional Planning 442 and Biology and Society 342)

Fall. 4 credits.
T R 10:10–11:25. T. J. Pinch.
A view of science less as an autonomous activity than as a social institution. We will discuss such issues as controversies in science, analysis of scientific text, gender and the social shaping of scientific knowledge.

[S&TS 465 Scientific Rhetoric in Historical Perspective (also History 465 and Communication 465)

4 credits. No prerequisites. Next offered 1993–94.
Spring. P. R. Dear, B. V. Lewenstein.
Exploration of the development of scientific discourse since the Scientific Revolution, with special emphasis on understanding the rhetorical purposes served by differing forms and techniques. Readings will include classics from Newton, Darwin, Einstein, and others, along with representative samples of more routine scientific communications. Students will prepare brief reports during the semester and a final term paper.]

S&TS 467 Innovation: Theory and Policy

Spring. 4 credits. Open to upper-level undergraduates and any interested graduate students. Prerequisite: Economics 102 or permission of the instructor.
J. Reppy.
Innovation, that is, the introduction of new technology into practice, is a course of economic growth and social change. In this course we will study the innovation process through the critical analysis of selected theories of innovation and supporting empirical evidence. Economic theories will be contrasted to the insights to be found in science and technology studies. The focus will be on the context of interests and ideology in which the various theories have been framed and their differing implications for technology policy. Authors to be covered include Schumpeter, Solow, Scherer, Nelson and Winters and Bijker and Pinch.

S&TS 469 Food, Agriculture, and Society (also Biology and Society 469 and Biological Sciences 469)

Spring. 3 credits. Prerequisite: an introductory biology course required, an introductory ecology course recommended, or permission of instructor. Limited to 20 students.
A. G. Power.
A multidisciplinary course that deals with the social and environmental impact of food production in the United States and developing countries. Agroecosystems of various kinds are analyzed from biological, economic, and social perspectives. The impacts of traditional, conventional, and alternative agricultural technologies are critically examined in the context of developed and developing economies. Specific topics include pest management, soil conservation, farm labor, land reform, biotechnology, and international food policy.

S&TS 471 Science Reliability and Authority

Fall. 4 credits.
R 1:25–4:25. D. Allchin.

[S&TS 483 The Military and New Technology (also Government 483)

Spring. 4 credits. Limited to 20 students. Next offered fall 1993.
J. V. Reppy.
In conventional wisdom, military organizations are seen paradoxically both as inflexible institutions and as proponents and consumers of rapid technological change. In this seminar we will examine changes over time in the attitude of the military toward new technology and analyze competing explanations for these changes. Readings will include Michael Howard, *War and European History*; John Ellis, *The Social History of the Machine Gun*; and Donald MacKenzie, *Inventing Accuracy: An Historical Sociology of Nuclear Missile Guidance*.]

S&TS 503 Professional Practice in Engineering (also Civil and Environmental Engineering 503)

Spring. 3 credits.
W. R. Lynn.
Financial, legal, regulatory, ethical, and business aspects of engineering practice are examined in detail. Students are expected to develop their understanding of the interrelationships among the physical, social, economic, and ethical constraints on engineering design.

S&TS 532 Inside Technology: The Social Construction of Technology

Spring. 4 credits.
T. J. Pinch.
Rather than analyze the social impact of technology upon society, in this course we will investigate how society gets inside technology. In other words, is it possible that the very design of technologies embody assumptions about the nature of society? And, if so, are alternative technologies possible which embody different assumptions about society? Do engineers have implicit theories about society? Is technology gendered? How can we understand the interaction of society and technology? Throughout the course the arguments will be illustrated by detailed examinations of particular technologies, such as the ballistic missile, the bicycle, the electric car, and the refrigerator.

S&TS 626 Workshop on Law, Science, and Technology (also Government 626)

Spring. 4 credits. Prerequisite: Gov 407/S&TS 407 or S&TS 442/CRP 442/B&Soc 342.
S. Jasanoff.
Legal proceedings provide a powerful mechanism for deconstructing, and to some extent reconstructing, a society's understanding about the nature and social role of expertise, the boundaries of science and technology, and the meaning or validity of scientific "facts." Using a combination of primary legal materials and theoretical studies in science and technology, this course will explore how varying scientific realities are constructed in legal forums and what impact these constructions have on the social relations of science and technology. The course will also consider the policy implica-

tions of conflicting legal and scientific approaches to the discovery and verification of scientific facts.

S&TS 631 Qualitative Research Methods for Studying Science
Spring. 4 credits.
T. J. Pinch.
Much has been learned about the nature of science by sociologists and anthropologists donning lab coats and studying scientists in action. In this course we will look at the methods used in this new wave of science studies. We will examine what can be learned by interviewing scientists, from videos and from detailed examinations of scientific texts. Students will gain hands-on experience by conducting a mini-project in which they investigate some aspect of scientific culture.

S&TS 660 Social Analysis of Ecological Change (also Biology and Society 460 and Rural Sociology 660)
Spring. 4 credits. Prerequisite: one year of science. Limited to 20 graduate students and seniors with permission of instructor.
P. J. Taylor.
Studies of ecological and social processes, together with their interpretation by historians, sociologists, and anthropologists. Topics include ideas of Nature, cybernetics, systems ecology, the tragedy of the commons, the *Limits to Growth*, human ecology, local knowledge, political ecology, gender analyses, and climate change.

S&TS 662 Science and Social Theory
Fall. 4 credits. Limited to 15 students.
Sem, T 7:00–10:00 p.m. P. J. Taylor.
Issues in social theory, or more broadly, social thought, raised by historical and contemporary studies of science and technology. Focal theme for 1992: Agency and Structure—Problems of connecting individual and social, or micro and macro, levels of analysis.

S&TS 666 Perspectives on Science Writing (also Communication 666)
Fall. 3 credits. Open to graduate students and advanced undergraduates (with permission) from all departments.
M W 2:30–4:00. B. V. Lewenstein.
A graduate reading course that surveys the approaches that scholars have used to understand science communication, with special emphasis on scientific information intended for nonscientists. Among the perspectives are history, sociology, journalism, risk communication, agricultural communication, literature, and philosophy. To supplement the primary goals of the course, students may also learn basic techniques of science writing.

S&TS 688 International Environmental Policy (also Government 687)
Spring. 4 credits.
S. Jasanoff.
This course examines the emergence of the environment as an important item on the political agendas of nations and the evolution of national and international policy responses to environmental issues. Analytically, the course attempts to define the distinctive characteristics of environmental policy and politics in our time and to identify the factors that promote convergences and divergences among different national approaches to the same environmental problems. The scope of the course is therefore both cross-national and international, embracing developing as well as industrialized countries. Particular attention is given to the role of legal and scientific institutions, processes, and instruments in the resolution of environmental controversies. Among the specific issues to be considered are chemical control, risk communication, export of hazards, stratospheric ozone depletion, and global climate change.

S&TS 711 Introductory Seminar in Science and Technology Studies (pending EPC approval)
Fall. 2 credits. S–U grades only. Incoming S&TS graduate students must take this course.
F 10:10–12:05. T. Pinch.
This introductory course is designed for incoming graduate students and will run as a weekly seminar. It will serve as a forum for discussion of the main perspectives and approaches in S&TS as represented by current departmental faculty. Every week a different S&TS faculty member will introduce a discussion of one of their own pieces of writing. It is expected that all members of the seminar will have read the piece beforehand. One faculty member will be appointed to coordinate the seminar. Other interested faculty and graduate students are encouraged to attend. The seminar will be pass/fail only for two credits. A pass will be awarded to students who satisfactorily attend and participate in the seminar.

S&TS 721 Sociology of Environment and Development (also Rural Sociology 721)
Spring. 3 credits.
Staff.
This course focuses on recent theories relating to societal-environmental relations in the context of social change and development and on the implications of these theories for development policy. Theoretical topics covered will normally include the conceptualization of nature and resources in the classical sociological tradition, the debate over neo-Malthusianism, theories of extractive economies and the valuation of nature, co-evolutionary development, political-economic approaches to land degradation and environmental destruction, the state and environmental policy, and new-social-movements and post-industrial-society perspectives on environmental mobilization. Alternative conceptualizations of the theory and practice of "sustainable development," particularly relating to agriculture and other primary production systems, will be stressed.

S&TS 751 Ethical Issues and Professional Responsibilities (also Biological Sciences 751 and Toxicology 751)
Spring. 1 credit. Limited to graduate students. S–U grades only.
Sem sections to be arranged. Multiple sections: 12 graduate students per section. Organizational meeting, W January 27, 3:35 p.m. J. Fessenden MacDonald.
Ethical issues and integrity in research, and the professional responsibilities of scientists are discussed. Readings from scientific, ethics, and general papers and government reports provide background for discussion. •Topics to be discussed include regulations, data manipulation and misrepresentation, fraud and misconduct, conflicts of interest and commitment, authorship, ownership, peer review, scientific response to external pressure, legal liabilities, and professional codes of ethics.

[S&TS 755 Biotechnology Transfer (also Biological Sciences 755)
Fall. 1 credit. S-U grades only. Next offered fall 1993.
Sem to be arranged. D. Wilson, J. Fessenden MacDonald.
Lectures and discussions on technology transfer and research in non-academic settings by speakers from industry, government, and academe. Focus will be on opportunities for technology transfer and research in areas of biotechnology (agricultural, food, environmental, pharmaceutical), biochemistry, bioengineering, and chemistry.]

Independent Study

S&TS 399 Independent Study
Fall or spring. 1–4 credits.
Staff.

S&TS 699 Independent Study
Fall or spring. 2–4 credits.
Staff.

Concentration in Science and Technology Studies

Jasanoff, S., chair; Boyd, R., Philosophy; Dear, P., History; Edwards, P., Science and Technology Studies; Jarrett, J., Philosophy; Kline, R., Electrical Engineering; Lewenstein, B., Communications; Lynn, W. R., Civil and Environmental Engineering; Miller, R., Philosophy; Pinch, T., Science and Technology Studies; Power, A., Ecology and Systematics; Rossiter, M., Science and Technology Studies; Taylor, P., Science and Technology Studies; and Williams, L. P., Science and Technology Studies.

The undergraduate concentration in Science and Technology Studies (S&TS) is designed for students who wish to engage in a systematic, interdisciplinary exploration of the role of science and technology in modern societies. The concentration is intended for students with varied academic interests and career goals. It offers majors in the natural sciences and engineering an opportunity to explore the social, political, and ethical implications of their selected fields of specialization. At the same time it offers students majoring in the humanities and social sciences a chance to study the processes, products, and impacts of science and technology from varied disciplinary perspectives. Drawing on course offerings in several departments, programs, and colleges, the S&TS concentration permits students to develop an individualized program of study closely related to their major field. S&TS courses are organized under four major headings: social relations of science and technology; science, technology, and public policy; ethics and values in science and technology; and biology, medicine, and society.

To satisfy the requirements for the S&TS concentration, students must complete a minimum of four courses selected from the following list. At least one course should be chosen from the list of core courses. The remaining three courses should be chosen in consultation with an S&TS faculty adviser and must be drawn from at least two of the areas described below.

Interested students may obtain further information about courses by contacting Peter Dear, faculty adviser, 255–6752 or the S&TS main office, 632 Clark Hall, 255-3810.

S&TS Core Courses

S&TS 281–282 Science in Western Civilization (also HIST 281–282)

S&TS 407 Law, Science, and Public Values (also Govt 407, B&SOC 407)

S&TS 415 The Politics of Technical Decisions (also CRP 541, Govt 628)

S&TS 442 The Sociology of Science (also B&SOC 342, CRP 442)

Social Relations of Science and Technology

COMM 360 Scientific Writing for Public Information

COMM 626 Impact of Communication Technologies

ENGR 101 The Computer Age (also COMS 101)

PSYCH 277 Psychology of Sex Roles (also Wms Stds 277)

R SOC 208 Technology and Society

S&TS 110 FWS Looking for the Scientific Method

S&TS 114 FWS: Ecology and Social Change

S&TS 167 FWS: Science In and Out of Lab

S&TS 250 Technology in Western Society (also EE 250, Engr 250)

S&TS 287 Evolution (also BioS 207, HIST 287)

S&TS 288 History of Biology (also B&SOC 288, Hist 288, BioS 202)

S&TS 292 The Electrical and Electronic Revolutions (also EE 292, Engr 292)

S&TS 324 Environment and Society (also RSoc 324)

S&TS 327 Computers and Society

S&TS 352 Science Writing for the Mass Media (also Comm 352)

S&TS 402 Investigative Research on the Social Impact of Science (also B&Soc 300, TXA 301)

S&TS 432 Minds, Machines and Subjectivity

S&TS 433 Comparative History of Science (also Hist 433) #

S&TS 444 Historical Issues of Gender and Science (also Wms Stds 444, Hist 444)

S&TS 465 Scientific Rhetoric in Historical Perspective (also Hist 465, Comm 465)

S&TS 482 The Origins of Modern Science 1500–1700 (also Hist 482) #

S&TS 487 Science, Technology, and Strategy in the Post-Napoleonic World (also Hist 487)

S&TS 488 The Golden Age of French Sciences: 1789–1830 (also Hist 488)

S&TS 525 Seminar in History of Technology

S&TS 532 Inside Technology: The Social Construction of Technology

S&TS 631 Qualitative Research Methods for Studying Science

S&TS 660 Social Analysis of Ecological Change (also B&Soc 460, RSoc 660)

S&TS 661 Science, Reality and Ideology: The Politics of Philosophy of Interpretation (also Phil 661, Eng 692)

S&TS 662 Science and Social Theory

S&TS 666 Perspectives on Science Writing (also Comm 666)

S&TS 680 Seminar in Historiographical Approaches to Science (also Hist 680)

S&TS 682 Seminar in the History of Nineteenth-Century Physical Science (also Hist 681)

S&TS 687 History of Agricultural Science (also Hist 687)

S&TS 781 Advanced Seminar in the History of Nineteenth-Century Physical Science

Science, Technology, and Public Policy

B&SOC 426 Medicine and the Law

GOVT 381 The Politics of Defense Spending

ILR 374 Technology and the Worker

PHYS 206 War and Peace in the Nuclear Age

S&TS 400 Components and Systems (also MAE 400)

S&TS 406 Biotechnology and Law (also B&Soc 406)

S&TS 427 Environmental Risk and Public Policy (also Govt 427)

S&TS 467 Innovation: Theory and Policy

S&TS 483 The Military and New Technology (also Govt 483)

S&TS 626 Workshop on Law, Science and Technology

S&TS 688 International Environmental Policy (also Govt 687)

S&TS 721 Sociology of Environment and Development (also RSoc 721)

Ethics and Values in Science and Technology

B&SOC 205 Ethics and Health Care (also Phil 245, BioS 205)

B&SOC 206 Ethics and the Environment (also Phil 246, BioS 206)

HSS 658 Professional Ethics and Public Policy

N RES 407 Religion, Ethics and the Environment

S&TS 286 Science and Human Nature (also Phil 286)

S&TS 360 Ethical Issues in Engineering (also Engr 360)

S&TS 381 Philosophy of Science: Knowledge and Objectivity (also Phil 381)

S&TS 384 Philosophy of Physics (also Phil 384)

S&TS 389 Philosophy of Science: Evidence and Explanation (also Phil 389)

S&TS 481 Problems in the Philosophy of Science (also Phil 481)

S&TS 503 Professional Practice in Engineering (also CEE 503)

S&TS 681 Philosophy of Science (also Phil 681)

S&TS 751 Ethical Issues and Professional Responsibilities (also BioS 751, Tox 751)

Biology, Medicine, and Society

B&SOC 232 Recombinant DNA Technology and Its Applications (also BioS 232)

B&SOC 322 Medicine and Civilization (also GS 322)

B&SOC 434 Biotechnology: Science, Policy, and Values (also BioS 434)

ENTOM 370 Pesticides, the Environment, and Human Health (also Tox 370)

N RES 401 Environmental and Natural Resources Policies

S&TS 233 Agriculture, History, and Society (also Hist 233)

S&TS 401 Biology and Society: The Social Construction of Life (also BioS 301, B&Soc 301)

S&TS 469 Food, Agriculture, and Society (also B&Soc 469, BioS 469)

S&TS 755 Biotechnology Transfer: Professional Issues and Social Concerns (also BioS 755)

Society for the Humanities

Jonathan Culler, Director

Fellows for 1992–93

Emily Apter (UC Davis)

Rae Banks (Cornell University)

Barbara Correll (Cornell University)

Julia Emberley (Trent University)

Hal Foster (Cornell University)

Werner Goehner (Cornell University)

Lucio Milano (University of Rome)

Robert Morgan (Cornell University)

Meaghan Morris (Free-Lance Writer, Australia)

Nkiru Nzegwu (SUNY-Binghamton)

Joel Porte (Cornell University)

Mikhail Ryklin (Academy of Sciences, Moscow)

Eric Santner (Princeton University)

Jane Schneider (City University, New York)

Gordon Teskey (Cornell University)

Jay Tribby (University of Florida)

The Society annually awards fellowships for research in the humanities. The Fellows offer, in line with their research, informal seminars intended to be exploratory or interdisciplinary.

These seminars are open to graduate students, suitably qualified undergraduates, and interested auditors. Students who want credit for a seminar should formally register in their own college. Persons other than those officially enrolled may attend as visitors with permission of the Fellow.

The theme for 1992/93 is **Studying Objects: Trash, Treasures, and Artifacts**.

S HUM 402 Fashion: Systems, Sign, and Fetish (also Women's Studies 432)

Fall. 3 credits.

J. Emberley.

In this seminar we will endeavor to develop theoretical approaches to contemporary fashion and the fashion industry to understand the competing and conflicting symbolic and economic values ascribed to these phenomena. The course will examine several historical and cultural examples of fashion from a variety of theoretical perspectives, including semiotics, Marxism, feminism, and postcolonialism.

S HUM 403 "Primitive" Scenes, Machine Dreams
Fall. 4 credits.
H. Foster.
There are several primal scenes in modernist art and literature, i.e., scenes in which riddles of origin, identity, and sexuality are teased out. Two in particular stand out: the traumatic encounter with "the Primitive" and with the machine. We will examine what is at stake in these sets of fantasmatic objects: for example, why artists such as Gauguin, Picasso, and Kirchner map sexual difference onto racial otherness, and why artists such as Marinetti, Léger, and Wyndham Lewis call for a machinic reconfiguration of body and psyche alike. Such case studies will allow us to think about specific crises in modernist masculinity, as well as general connections between modernism and modernization.

S HUM 404 Ramble City — The City and Its Decaying Future
Fall. 4 credits.
W. Goehner.
The seminar will discuss infrastructural urban objects in distress and their potential for restructuring the city. It will investigate urban and architectural practices that brought them about and link them with recent post-industrialist cultural practice and theoretical discourse. Urban projects of Coop Himmelblau, Rem Koolhaas, O. M. Ungers, and Peter Eisenmann will be discussed. Urban utopias and their representation in films will be studied. Special consideration will be given to the effect of these urban objects in distress on the critical self-awareness of the production of architecture as well as on the theoretical discourse about the future of the city. Readings may include theoretical essays by Paul Virilio, Peter Eisenmann, Fritz Neumeyer, Rem Koolhaas, Sol Yurik, Didier Gille, Gilles Deleuze, Felix Guattari.

S HUM 405 The Material Culture of a Syrian City State in the Third Millennium B.C.E. (also Near Eastern Studies 463 and Archaeology 463)
Fall. 3 credits.
L. Milano.
This seminar will focus on the epigraphical and archaeological evidence from the early Bronze Age site of Tell Mardikh/Ebla, considered as a case study for investigating the relationship between the technical terminology attested in the administrative texts and the artifacts and objects from the excavations. This course will provide a general survey of the material culture of a third-millennium city-state and investigate the possibility of establishing the relationship between archaeological and textual data. Among the methods used in the seminar will be the analysis of the typology of vessels and containers mentioned in the texts, the technological and metrological problems associated with them, and the possible identity of actual vessels and containers from the excavations; the examination of metal objects and metallurgy, for which there are detailed descriptions in the texts, and the comparisons with actual objects and the implications for the economic and ideological impact of metallurgy on the structural mechanisms of the circulation of goods and technology in the ancient Near East. Discussion of economic trends, trade, social organization, and political implications will round out the seminar.

S HUM 406 The Poetry of Things: A Workshop (also English 485)
Fall. 4 credits. Reading knowledge of French and Spanish.
R. Morgan.
A seminar devoted both to the writing of poetry and the study of the poetry of objects. Discussion will focus on the work by participants, the importance of objects in modern poetry, and the ways in which ordinary things, machines, even garbage, are rediscovered and transformed by poetry. Special emphasis will be given to accuracy in description, metaphor and moral, and the ways in which everyday things of our world are made new, strange, even sacred, by poetry. In the light of modern science and linguistics, how does poetry help us know the world of things? Readings will include examples of *Dinggedichte* in German poetry, texts by Francis Ponge and Jean Follain in French, Pablo Neruda in Spanish as well as poems by contemporary Americans.

S HUM 407 Paranoia and Ideology
Fall. 3 credits.
E. Santner.
Paranoia was a crucial part of the psychic mechanism whereby National Socialism was able to captivate large segments of the German population. This seminar will consider in detail the paranoid component of fascist ideology through close study of Daniel Paul Schreber, a richly documented case of paranoia from the turn of the century. Schreber's case provides a textual site to explore the interrelations, so important for the workings of Nazi ideology, between institutional and patriarchal power, gender identity, desire, and religious fantasy. Aside from Schreber's own account of his nervous illness, we will read commentary by Freud, Lacan, Canetti, Certeau, Foucault, Deleuze, Guattari, Zizek, and Theweleit.

S HUM 408 Commoditization as Process and Problem
Fall. 3 credits.
J. Schneider.
Is there, as Igor Kopytoff suggests, an inherent drive "to extend the fundamentally seductive idea of exchange to as many items (goods and services) as existing exchange technology will comfortably allow?" If so, what are the implications for changing patterns of production and consumption? And, what sorts of forces—individual and collective—counteract the drive? We will examine these questions in light of a) theories of exchange; b) historical and recent extensions of the commodity relation to new domains; and c) the consequences and responses. What happens, this course will ask, when commoditization engulfs sanctified objects crafted for ritual purposes? Parts of the human body, such as blood, semen, ova? Land and labor? Arms and drugs or sugar? Obtaining a spouse or caring for the elderly? Through case studies such as these, an effort will be made to build up cross-cultural comparisons regarding the pervasiveness of and tolerance for the commoditization process—in general and vis-ā-vis particular domains. We will also attempt to assess this process as a global phenomenon in the late twentieth century.

S HUM 409 The Formation of Canonical Objects (also English 403)
Fall. 4 credits.
G. Teskey.
An investigation of the formative categories (e.g., monumentality, memory, reflection, imitation, imprintedness, transmission, and substance) within which we understand certain made things as having exceptional cultural value. The field of cultural studies can be divided into a theory of production (creative work), a theory of function (poetics), and a theory of social purpose (ideology). We will focus on the third of these areas, particularly as it bears on the notion of a "western tradition" sustained by a "handing on" of privileged, interpretable things. This will lead us back to ideological questions concerning the "natural" substance out of which these things are supposed to be made, and to more fundamental questions about violence and creative work. Readings are selected from a broad range of literary texts (e.g., *The Iliad*, *The Faerie Queene*, *Finnegans Wake*) and from passages on things in Nietzsche, Heidegger, and Benjamin.

S HUM 410 Objects R Us: Museum Effects and the Writing of History
Fall. 3 credits.
J. Tribby.
Tropes of purposive collection and disinterested display figure prominently in the writing of modernist historians and new historicists alike. The varied activities for this seminar are intended to historicize—and denaturalize—their privileged status. Topics to be examined include the cultural politics of the photographic and ethnographic act; the role of professional journals in the disciplining of historiographic voice; and deconstructive approaches to manuscript work.

S HUM 413 Colonial Seductions: Feminism, Psychoanalysis, and Orientalist Spectacle in France and North Africa
Spring. 3 credits. Reading knowledge of French.
E. Apter.
In its examination of colonial fiction, entertainment, and image-production, 1870 to 1940, this course will consider some of the methodological tensions between postcolonial theory, French feminism, and psychoanalysis. Emphasis will be placed on a critique of the current categories and theoretical terms of cultural studies used to frame global politics and the erotic exoticist legacy. Problems to be addressed specifically will include the genre of colonial realism and its reliance on the stereotype; cultural fetishism and visual seduction in the display of peoples; paradigms of the "re-enchantment industry"; the ways in which French feminism generated a kind of lesbian theatricality from Orientalist scenarios of the harem, the world of the female entertainer, or the legendary woman of antiquity (Cleopatra, Thaïs, Sémiramis). Readings will range from representative texts of French colonial fiction and theatre (Pierre Loti, Isabelle Eberhardt, Elissa Rhaïs) to critical writings by Said, Barthes, Zizek, Tagg, Cixous, Sue Ellen Case, and Fatima Mernissi.

S HUM 414 "Wacky Dust": Variations on the Theme of Cocaine, Culture, and Politics in Black America
Spring. 3 credits.
R. Banks.
This seminar will explore variations on the theme of cocaine, culture, and politics in the context of African-Americans' unique status in the nation's political economy. From the institutionalization of drugs as an "American

disease" to the contemporary "crack" cocaine crisis, this course will examine political and cultural transformations associated with the myth and reality of cocaine use in the Black community. Through the medium of drug literature, biography, music, and film, we will explore such topics as early industrial capitalism and the ubiquity of cocaine in the turn-of-the-century Black cocaine "episode"; the Blues as transcendent discourse in the era of "Jim Crow"; "Black power" and "the drug of choice" as a metaphor for post-Movement cultural confusion; and the contemporary crack crisis, cultural diffusion, and late capitalism.

S HUM 415 Love Language, Money Talk in Renaissance Literature
Spring. 4 credits.
B. Correll.
The course will investigate the role of money in English Renaissance literature, pondering the links between money and gender, coins and characters, financial and psychic economies in Renaissance drama and poetry. Dramatic plots of exchange and succession, sexual and symbolic economies in character development and lyric structures, pursuits of exchange in dramatic and poetic texts are among the issues we will consider. Readings will include such authors as Marlowe, Shakespeare, Dekker, Jonson, Marston, Wyatt, Donne; contemporary documents on usury, patronage, credit, debt and loans; and both classical and recent cultural-theoretical material.

S HUM 416 Gifts and Fetishes
Fall. 4 credits.
H. Foster.
This course will examine the historical, theoretical, and artistic articulations of these two paradigms of object-relations, which partake of both anthropological and psychoanalytical discourses and which suggest connections between political and psychic economies. We will attempt three things: 1) to locate these terms in specific historical (mis)recognitions of the material cultures of different "exotic" societies; 2) to consider what work they do, what effects they have, in different modern discourses (the fetish in Marx and Freud, but also in de Brosses, Hegel, Comte, etc.; the gift in Mauss and Bataille, but also in Situationism and Baudrillard); and 3) to see how they are inflected in (post) modernist art, especially in its double contestation of traditional aesthetics and commodity exchange (in Dada and Surrealism, but also in the neo-avant-garde, feminist art and theory, ready-made art, postcolonial representations, etc.)

S HUM 417 The Museum in Distress—Practices in and around the Museum
Spring. 4 credits.
W. Goehner.
The seminar will study the museum in the context of the city and recent cultural practices. It will analyze the censorial activities of the museum space. Examples of recent museum designs of James Stirling, Gae Aulenti, Frank Gery, Rafael Moneo, Hans Hollein, and myself as well as recent productions in art by Danie Buren, Joseph Beuys, Hans Haacke, Louise Lawler, Christy Rupp, and Krzysztof Wodiczko will be discussed. We will focus on productions and their ability to reveal the limits of the current museum practices as well as on the need to reposition the museum within post-industrial cultural practice. Readings may include theoretical essays by Douglas Crimp, William Rubin, Benjamin Buchloh, Hal Foster, Kenneth Frampton, Hehid Ghafouri, Alan Colquhoun, Patricia Mainard, Hans Haacke, Hans Magnus Enzensberger, Max Horkheimer, Theodor Adorno, and Peter Bürger.

S HUM 418 Ordinary Stuff: Popular Memory and Historical Practice in Commodity Cultures
Spring. 3 credits.
M. Morris.
"Stuff" has many uses in everyday speech, where it organizes a discourse on cultural values. In Australian English, for example, it can signify the materials of intimate social identity ("my stuff"), a rejection of certain ideas and practices ("all that stuff"), or an elusive substance distinguishing a given mythic form ("the stuff"). In mass-mediated societies, "stuff" is the name of a discursive space in which people reconstruct relations between objects and practices, structure and agency, dreams and memories. The premise of this course is that people in such societies do not lack, as some critics claim, a "sense of history"; critics must rather recognize and develop new ways of making historical sense. We will examine some basic theories of commodification and historical consciousness (Lukács, Benjamin, Adorno, Lefebvre, Jameson, Baudrillard, Harvey) in order to explore the work of some recent theorists and historians of popular culture "stuff" (including Michel de Certeau, Gilles Deleuze and Félix Guattari, Susan Stewart, Dipesh Chakrabarty, Stuart Hall, Ross Gibson, Michele Wallace).

S HUM 419 Memory, Knowledge, and Orality
Spring. 3 credits.
N. Nzegwu.
This seminar is a systematic investigation of the nature and role of memory in the construction of knowledge in orality and in cultural survival. We will address how recollection is to be construed as an epistemic process and how this construal forces a revision of the idea of memory as cognitively unreliable. Related issues are: what is a mnemonic system? How does this pattern of information-processing lead to a redefinition of notions of identity and temporality? Critical to this investigation is the nature of the relevant criteria and conditions of knowing in a context of orality.

S HUM 420 Elijah's Manna. The Quaker Oats Man and American Mythology: Breakfast Cereal as Cultural Archive
Spring. 4 credits.
J. Porte.
Beginning with a semiotic analysis of American cereal boxes, this seminar will explore the ways in which these material objects, and the industries for which they stand, both reflect the development of American culture historically and helped shape that culture. Topics to be investigated include such things as the history of food reform (vegetarianism, temperance, the "pure food" movement), the development of Battle Creek Michigan by the Seventh Day Adventists in relation to the careers of the Kellogg brothers, the life and writings of C. W. Post, the founding and expansion of the Quaker Oats Company and its relation to the "Puritan" past. In addition to writings by cereal makers and their advertising agents, we shall trace the links of this movement to literary texts. Readings will also include essays by Roland Barthes, Mary Douglas, and Clifford Geertz, as well as chapters in such books as Goodrum and Dalrymple, *Advertising in America* (and other studies of advertising), Steven Nissenbaum's *Sex, Diet, and Debility in Jacksonian America*, Larry Massie's *Battle Creek, the Place Behind the Products*, and Gerald Carson's *Cornflake Crusade*. The course will make extensive use of such visual materials as American paintings and advertising layouts and design.

S HUM 421 Nabokov's and Other Russias
Spring. 3 credits.
M. Ryklin.
We shall compare Nabokov's reading of Russian and Soviet contexts to those of others, from Bakhtin's polyphony to deconstruction, simulationism, and a whole array of postmodernisms. Key terms include translatability, parergon, terror as carnival, miniaturized private objects of desire, philistinism, and the Dostoevsky/Tolstoy issue. The course will attempt to deconstruct the notion of "Russianness." Visual materials will be included.

South Asia Program

D. Gold, director; R. Ahmed, T. Barker, R. Colle, E. Erickson, C. Fairbanks, S. Feldman, J. W. Gair, A. Gold, R. Herring, D. Holmberg, J. Jasanoff, S. Jasanoff, M. Katzenstein, V. Kayastha, K. A. R. Kennedy, S. Kurunvilla, B. Lust, B. G. MacDougall, M. Majumdar, K. March, F. McCarthy, C. Minkowski, S. Mohanty, A. Nussbaum, S. O'Connor, S. Oja, P. Olpadwala, B. Perlus, T. Poleman, D. Sisler, D. Sudan, N. Uphoff, M. Walter, S. White

The South Asia Program coordinates research, teaching, and special campus events relating to Bangladesh, India, Pakistan, Nepal, and Sri Lanka. The program faculty includes members from a variety of disciplines, including agricultural economics, agricultural engineering, anthropology, architecture, art, city and regional planning, communication, comparative religion, ecology and systematics, economics, English, government, history, history of art, human ecology, industrial and labor relations, international agriculture, linguistics, literature, rural sociology, and science, technology, and society. Undergraduates with a special interest in the region may major in Asian studies with a South Asia concentration, or complete a South Asia concentration with any other major. Graduate students may pursue the M.A. degree in Asian Studies with a concentration in South Asia. Languages offered are Bengali, Hindi, Nepali, Punjabi, Sinhala, Tamil, Urdu, Sanskrit, and Pali. Cornell is a class A member of the American Institute of Indian Studies (AIIS), and undergraduates as well as graduate students are eligible for AIIS intensive language program fellowships in India. For courses available in South Asian studies and details on the major, see the Department of Asian Studies listing in this volume.

Students who want further information on courses and research opportunities should direct questions to the program office, 170 Uris Hall.

Southeast Asia Program

R. Barker, director; B. R. Anderson, J. H. Badgley, T. Chaloemtiarana, G. Diffloth, M. F. Hatch, A. T. Kirsch,S. J. O'Connor, T. Shiraishi, J. T. Siegel, K. W. Taylor, E. Thorbecke, J. U. Wolff, D. K. Wyatt

Southeast Asia studies at Cornell is included within the framework of the Department of Asian Studies. Twelve full-time core faculty members in the colleges of Arts and Sciences and Agriculture and Life Sciences participate in an interdisciplinary program of teaching and research on the history, culture, and societies of the region stretching from Burma through the Philippines. Courses are offered in such fields as agricultural economics, anthropology, Asian studies, economics, government, history, history of art, linguistics, music, and rural sociology. Instruction is also offered in a wide variety of Southeast Asian languages: Burmese, Cambodian, Cebuano (Bisayan), Indonesian, Javanese, Tagalog, Thai, and Vietnamese, for which Foreign Language Area Studies Fellowships are available to U.S. citizens. Intensive instruction is offered in the Full-Year Asian Language Concentration (FALCON) in Indonesian which covers the beginning and intermediate levels. An intensive advanced Indonesian language program is held from June through August in Indonesia each summer. The formal program of study at Cornell is enriched by a diverse range of extracurricular activities, including an informal weekly luncheon seminar, the concerts of the Gamelan Ensemble, a weekly Southeast Asia film series. The newly opened George McT. Kahin Center for Advanced Research on Southeast Asia is also the site for public lectures and other activities related to this area. The John M. Echols Collection on Southeast Asia, in Olin Library, is the most comprehensive collection on this subject in America.

Undergraduates may major in Asian studies with a focus on Southeast Asia and its languages, or they may elect to take a concentration in Southeast Asia studies by completing 15 credits of course work. Students interested in exploring these opportunities should consult the director, Southeast Asia Program, 120 Uris Hall.

Statistics Center

The Cornell Statistics Center coordinates a university-wide program in statistics and probability. Students interested in graduate study in probability and statistics should apply to the Field of Statistics or to one of the other graduate fields of study that offer related course work. A list of courses in probability and statistics recommended for graduate students in the Field of Statistics can be found in the description of the Cornell Center for Statistics in the section "Interdisciplinary Centers and Programs." Further information can be obtained from the director of the Statistics Center in Caldwell Hall.

Women's Studies Program

S. McConnell-Ginet, Director; L. Abel, A. Adams, J. Allen, D. Bathrick, S. Bem, L. Beneria, J. Bernstock, J. Blackall, J. Brumberg, D. Castillo, A. Cook, B. Correll, I. DeVault, I. Ezergailis, J. Farley, S. Feldman, F. Firebaugh, J. Fortune, N. Furman, J. Gerner, J. Ginsburg, N. Hirschmann, D. Holmberg, I. Hull, B. J. Isbell, M. Jacobus, M. Katzenstein, C. Lazzaro, J. Locey, K. March, C. A. Martin, H. Mullen, M. B. Norton, L. Peirce, L. Philips, S. Samuels, D. Scott

The Women's Studies Program explores the histories and situations of women in different cultural and social contexts and the myriad ways in which sexual difference is overtly and covertly transformed into social advantage or disadvantage. The program investigates how the institutionalization and representation of sexual difference structures our social relations, cultural values, and educational parameters—including what we consider "objective" reasoning and "impartial" observation. The program also challenges the uncritical thinking and lack of knowledge about women that currently exists in all of our scholarly disciplines, thereby developing new perspectives and knowledge that draw not only on academic scholarship itself, but also on feminist politics and theory.

Program Offerings

The Women's Studies Program offers an undergraduate major, an undergraduate concentration, and a graduate minor. Undergraduate students in the College of Arts and Sciences who want to major in women's studies can apply directly to the program or design their own major through the College Scholar Program.

The Undergraduate Major

The questions posed by feminist inquiry cannot be answered from within any single discipline or even from a simple combination of two or more disciplines. For that reason, the Women's Studies major provides students with a basic groundwork in the interdisciplinary field of Women's Studies and requires each student to construct a more advanced and individually tailored program of study on a topic, in a discipline, or in a combination of disciplines of special interest to the student alone.

Rather than specifying a particular sequence of required courses for each and every student, the Women's Studies major gives a starting point in Women's Studies from which to begin, an active advisory structure to help them shape their concentration, and an ongoing impetus to self-reflection about their entire program of undergraduate study.

Requirements for a Women's Studies Major

1. Prerequisite Courses: The student must complete two Women's Studies courses prior to applying to the major. Freshman writing seminars will count toward the prerequisite course credits; however, they cannot count toward general or specialized credits.
2. Required Course Work: All students will design a curriculum to meet the following criteria.
   a. The students should complete three general courses to be selected from three of the five Women's Studies areas (feminist theory, history, humanities, science and medicine, and social sciences). These courses will typically be drawn from the list of 100- and 200- level courses. Under some circumstances, some 300- level courses will count as "general" course work. Students may count no more than four general courses, including those they have taken as prerequisites, toward their major in Women's Studies.
   b. The students must complete seven specialized courses at the 300-level or above. Occasional exceptions to the 300-level regulation may be permitted with the adviser's approval if a solid, challenging, and coherent course of study can be demonstrated.
   c. A senior seminar is to be taken in either semester of the senior year which includes a senior project or paper.
3. Coherence Requirement: Each student must write a proposal for admission to the major. It should describe the individual focus or area of concentration, whether entirely within Women's Studies or drawn from another major through which their Women's Studies major will be integrated. Students opting to complete a second concurrent major will also have to show how the work in the two majors will be coordinated.

   Final Statement: All seniors will prepare an individual statement explaining the coherence of their major and their reflections on its strengths and weaknesses. Students should submit these statements to their advisers at the beginning of the last semester before graduation.

Required course work must represent at least a "C" work in eleven courses with a minimum of 36 credit hours in Women's Studies. To be eligible for honors, students must have a cumulative grade average of B- in all Arts and Sciences course work and a A- or better in all course work applying to their major. Qualified students can apply for honors by submitting an application including a copy of their transcript, their Women's Studies major proposal, a letter of support from their adviser, and a brief prospectus for their honor's thesis. This application should be turned in to the Director of Undergraduate Studies (DUS) no later than the second week in April in the student's final semester. Applications will be evaluated by the Honors Committee on the basis of course work, written work, and overall scholarly excellence.

The Concentration

Undergraduate students in any college at Cornell can concentrate in Women's Studies in conjunction with a major defined elsewhere in the university. The concentration consists of four courses, two general and two specialized. These courses are selected by the student and approved by the Women's Studies Program's Director of Undergraduate Studies (DUS) and the student's faculty adviser chosen from the program's teaching faculty.

A final statement must be filled out by the student to document the completion of course work required for a concentration in Women's Studies. This statement should be submitted to the DUS for approval before graduation.

For further information, students can contact the Women's Studies Office located in 391 Uris Hall, or call 255-6480.

I. Freshman Writing Seminars

WOMNS 105 Feminine and Masculine Ideals in Japanese Culture (also Asian Studies 105)

Spring. 3 credits.
Staff.
In its long history, Japanese culture has developed a large number of role models—the aristocrat, poet-priest, warrior, entertainer, "salary man," and "education mama"—and idealized them in its literature and art. Using these ideals as its subject matter, the seminar

will give students practice in reading texts closely, analyzing ideas, and writing various types of papers. Through studying Japanese concepts of femininity and masculinity, the students will not only explore a new culture but will also gain new perspectives on their own cultures.

WOMNS 106 Women and Writing (also English 105)
Fall and spring. 3 credits.
Hours to be arranged. Staff.
What is a woman? How does she confront her personal experience? Does she play a special role in history, in our definition of society, or in our understanding of language and literature? This course will explore the relationship between women and writing. We will discuss writings by and about women, debate our attitudes toward feminism, and analyze the relevance of these questions to our own written work. Individual sections will emphasize different aspects of the relation between women and writing. Which section to choose should depend on your own interest in exploring how women appear in private or autobiographical writings, historical contexts, and/or literary works. Further information on specific sections is available in the freshman writing seminar office. Textual overlap among the sections is kept to a minimum so that students can take more than one Women and Writing seminar during their time at Cornell.

[WOMNS 107 The Family in American History (also History 107)
3 credits. Not offered 1992–93.
M. B. Norton.]

[WOMNS 121 Language and Gender (also Linguistics 121)
Spring. 3 credits. Not offered 1992–93.
Sally McConnell-Ginet.
What does it mean to speak "like a woman" or "like a man," or "like a girl," or "like a boy?" Even ten-year-olds in our culture approach similar communicative tasks in gender-differentiated ways: girls often get others to do things by saying things like "let's get some coat-hangers" whereas their male peers are more likely to say something like "get me a coat hanger." How do race, social class, age, setting, and aims interact with gender in affecting communicative style? How do our ways of writing and talking reflect and perpetuate gender stereotypes or biases? What is the role of sex and gender in language change? Readings, discussion, and writing assignments will explore connections between our uses of language and the cultural construction of femaleness, maleness, and sexuality.]

WOMNS 168.01 Black Women Writers: The Uses of Madness and Silence (also English 168)
Spring. 3 credits. Disc/sem.
Harryette Mullen, group leader: Shelly Wong.
How are silence and madness used in texts by black women writers to explore their relationship to language, writing, and power? Why is madness a compelling metaphor for the complexities of race, class, gender, and cultural conflict? How does one interpret the silences in a text? How is silence itself foregrounded in a literary text? This seminar will focus on these and other questions raised by the novels, short stories, poetry, and drama of black women writers from Africa, the United States, and the Caribbean including Bessie Head, Toni Morrison, Adrienne Kennedy, Opal Palmer Adisa, Tsitsi Dangarembga, Marlene Philip, and Jamaica Kincaid.

II. General Courses

WOMNS 206 Gender and Society (also Rural Sociology 206)
Spring. 3 credits.
N. Glasgow.
This course analyzes the evolution and diversity of socially constructed gender hierarchies, including a focus of international comparisons. The maintenance of gender inequalities in societal institutions will be explored. A range of sociological theories and disciplinary perspectives are considered, including biological, psychological, psychoanalytic, and anthropological perspectives. These objectives will be achieved through lectures, readings, films, class discussions, and personal experiences.

WOMNS 210 Introduction to Women's Studies
Fall. 4 credits.
Staff.
This course introduces students to critical approaches in feminist scholarship to the cultural, socioeconomic, and political situation(s) of women. Particular attention will be paid to the conceptual challenges and dangers posed by attempts to study women without taking account of relations between race, class, and gender in ideological and social formations. Readings will draw on work in various disciplines and will include literary texts and visual images.

WOMNS 214 Biological Basis of Sex Differences (also Biological Sciences 214)
Fall. 3 credits. Prerequisite: one year of introductory biology. Limited to non-biology majors and freshman and sophomore biology majors. S-U grades optional. Offered in alternate years.
J. E. Fortune.
The structural and functional differences between the sexes are examined. Emphasis is placed on mechanisms of mammalian reproduction; where possible, special attention is given to studies of humans. Current evidence on the effects of gender on non-reproductive aspects of life (behavior, physical, and mental capabilities) is discussed. The course is intended to provide students with a basic knowledge of reproductive endocrinology and with a basis for objective evaluation of sex differences in relation to contemporary life.

WOMNS 218 The Economics of Gender (also City and Regional Planning 218)
Spring. 3 credits.
L. Beneria.
The emphasis in this course will be on the economic aspects of women and work: What are the consequences of women's concentration in reproductive work? What economic role does domestic work play within the larger economy? What are the consequences of occupational segregation by gender? Why is the wage gap between men and women not disappearing? What is the role of discrimination? What is the condition of women in other countries? Throughout the course we will examine different analytical frameworks and distinguish between different feminist perspectives dealing with those questions.

[WOMNS 227 Modern American Sex Roles in Historical Perspective (also History 227)
4 credits. Limited to 20 students. Permission required. Intended primarily for sophomores. Not offered 1992–93.
M. B. Norton.
A reading and discussion course. The class will begin by examining sex roles in the United States in the 1990s, looking at a variety of sources like popular magazines and contemporary commentaries. We will then move backwards in time in an attempt to uncover the roots of current attitudes. The students will help to determine which topics the class will investigate in detail.]

[WOMNS 244 Language Use and Gender Relations (also Linguistics 244)
4 credits. Next offered 1993–94.
S. McConnell-Ginet.
This course explores connections between language (use) and gender/sex systems, addressing such questions as the following. How do sex and gender affect the ways we speak, the ways we interpret and evaluate speech? How do sociocultural differences in women's and men's roles affect their language use, their relation to language change? What is meant by sexist language? How does conversation structure the social worlds of women and men? Readings draw from work in linguistics, anthropology, philosophy, psychology, literature, and general women's studies and feminist theory.]

[WOMNS 248 Major Nineteenth-Century Women Novelists (also English 247) #
4 credits.
J. Blackall. Not offered 1992–93.
This course gives particular attention to the biographical and social circumstances surrounding the novels, their critical reception within their own time, and the themes and subject matter that women novelists elected to write about. The reading includes masterworks and certain other works that exerted a major imaginative impact on contemporary readers. Readings are Austen, *Persuasion*; C. Bronte, *Jane Eyre*; E. Bronte, *Wuthering Heights*; Gaskell, *Mary Barton*; Stowe, *Uncle Tom's Cabin*; Eliot, *The Mill on the Floss*; Gilman, *The Yellow Wallpaper*; and Chopin, *The Awakening*. In addition, two twentieth-century works, Jean Rhys's *Wide Sargasso Sea* and Edith Wharton's *Ethan Frome*, will be approached as imaginative sequels to *Jane Eyre* and *Wuthering Heights* respectively.]

[WOMNS 251 Twentieth-Century Women Novelists (also English 251)
4 credits. Not offered 1992–93.
S. Samuels.
This course will be particularly concerned with how women write fiction and with some of the questions about women's experience, perspective, and language raised by recent feminist criticism. We will read works by Virginia Woolf, Edith Wharton, Toni Morrison, Louise Erdrich, Maxine Hong Kingston, and others.]

[WOMNS 273 Women in American Society, Past and Present (also History 273) #
4 credits. Not offered 1992–93.
M. B. Norton.
A survey of women's experiences in America from the seventeenth century to the present. Among the topics to be discussed are women's familial roles, the changing nature of

household work, racial and ethnic differences in women's experiences, the women's rights movement, employment of women outside the home, and contemporary feminism.]

WOMNS 277 Psychology of Sex Roles (also Psychology 277)
Spring. 3 credits. Limited to 300 students.
S. Bem.
This course addresses the very broad question of how an individual's gender and sexuality are constructed. Although some attention is given to biological perspectives, the course emphasizes the social-psychological processes by which the culture transforms male and female newborns into "masculine" and "feminine" adults. In addition to being quite interdisciplinary, the course is also oriented to questioning the "naturalness" of not only masculinity and femininity themselves, but exclusive heterosexuality as well. Among some of the specialized topics discussed are psychological androgyny, equalitarian relationships, gender-liberated child-rearing, the male-centeredness of the work world, female sexuality, sexual harassment, and homophobia.

WOMNS 321 Sex and Gender in Cross-Cultural Perspective (also Anthropology 321) @
Fall. 4 credits.
K. S. March.
An introduction to the study of sex roles cross-culturally and to anthropological theories of sex and gender. The course examines the relative positioning of the sexes in social, political, economic, ideological, cultural, and biological aspects of culture; we emphasize the diversity in gender and prospects for change around the world. In addition to lectures and films or videos, participants will work in small discussion sections (maximum enrollment of eight) to prepare several practical field exercises, short papers and critical assessments of other course materials.

[WOMNS 345 Gender Inequality (also Sociology 345)
4 credits.
H. Walker.
This course is an introduction to the systematic study of gender inequality in contemporary society. While the issues we will examine are specific to the study of gender inequality, they are representative of more general concerns in the field of sociology, e.g., stratification, power, and conflict.]

WOMNS 353 Feminism: State and Public Policy (also Government 353)
Spring. 4 credits.
M. Katzenstein. Students seeking admission to this course *must* attend the first class.
The course examines the aims and strategies of the feminist movement in the United States and the response of both society and the state to feminist claims. It is, thus, a course about political protest and the capacity of American political institutions to promote and shape, as well as to counter social change. In examining the law and public policy on such issues as job discrimination, wife battery, rape, abortion, etc., the course explores the contradictions between, and the congruence of, the dual ideals of individual choice and group equality.

[WOMNS 365 Directions in Feminist Theory (also Government 362)
4 credits. Limited to 25 students. Not offered 1992–93.
C. A. Martin.
This course is designed to explore critical debates in contemporary feminist theory with particular attention to the status of gender as an analytic and political category. We will investigate how different theoretical traditions and perspectives relate gender to structures of race, sexuality, and class.]

WOMNS 374 Nineteenth-Century American Women Writers (also English 374)
Fall. 4 credits.
L. Brown.
In this cross-cultural examination of nineteenth-century American women writers, we will contrast a variety of nineteenth-century works of fiction, political/feminist manifestos and slave narratives. We will investigate the ways in which these writers used their texts to construct culturally valuable and authentic selves. We will also consider tensions between "sentimental" idealism and political pragmatism, passionless femininity, and autonomy. Readings will include Louisa May Alcott's *Behind a Mask*, Anna Julia Cooper's *A Voice from The South*, Frances Harper's *Iola LeRoy*, Harriet Beecher Stowe's *The Ministers' Wooing*, and Harriet Wilson's *Our Nig*.

III. Specialized Courses and Seminars

WOMNS 238 The Historical Development of Women as Professionals, 1800–Present (also Human Development and Family Studies 258 and History 238)
Fall. 3 credits.
J. Brumberg.
The historical evolution of the female professions in America (midwifery, nursing, teaching, librarianship, home economics, and social work) as well as women's struggles to gain access to medicine, law, the clergy, and the academy. Lectures, reading, films, and discussion are geared to identifying the cultural patterns that fostered the conception of gender-specific work and the particular historical circumstances that created these different work opportunities. The evolution of professionalism and the consequences of professionalism for women, family structure, and American society are also discussed.

[WOMNS 264 Ethnic Literature: Bridges and Boundaries (also English 264)
3 credits. Not offered 1992–93.
Harryette Mullen, Shelly Wong.
The American language that came, as William Carlos Williams noted, "from the mouths of Polish mothers," has also been shaped by the oral and written traditions of Native Americans, African Americans, Hispanic Americans, and Asian Americans whose literary production will be examined in this course. Works by writers in these traditions will be studied as sites marking the emergence of a contemporary American language and literature capable of representing the diverse and particular realities of a multicultural nation. This course will focus especially on how each ethnic tradition uses the contested territories of geography, language, gender and sexuality in texts that both refer to and imaginatively construct communities and traditions based on collective experience. Discussion will focus on how each text makes connections and distinctions between individuals as well as within and among communities bound together by shared linguistic, geographical, spiritual, and cultural traditions, and the territorialization of bodies, especially women's bodies, as boundaries or bridges between races/ethnicities, in discursive constructions of ethnicity.]

WOMNS 281 Gender and Society in the Muslim Middle East (also Near Eastern Studies 281 and Religious Studies 281) @#
Spring. 3 credits.
L. Peirce.
This course examines conceptions of gender in traditional Muslim society and the ways in which they have affected the experiences of Muslim women and men. Topics to be covered include the position of women in the religious law of Islam, female seclusion and the harem, social hierarchies and family structure, sexuality, and the problem of Western perceptions of Muslim society. Although attention will be given to gender issues in the contemporary Middle East, the course focuses on the historical roots of present-day social configurations. Readings which include primary sources in translation and visual materials (slides, movies) will form an integral part of the course.

WOMNS 305 Emotion, Cognition, and Culture (also Anthropology 305) @
Fall. 4 credits.
B. J. Isbell.
This course introduces students to the current anthropological perspective on the following topics: (1) cultural shaping of emotion, (2) acquisition and production of gender and sexuality, and (3) cognition and classification in cross-cultural context. It is appropriate for students majoring in anthropology, psychology, cognitive studies, human development and family studies, and women's studies.

WOMNS 307 African-American Women in Slavery and Freedom (also History 303)
Spring. 4 credits.
M. Washington.
This course thematically explores the history of African-American women from a sociopolitical perspective. Topics include the images and depictions of Black women, how Black women have engaged in political struggle, race progress vs. feminism, the relationship between racism and sexism, and Black women in family life.

[WOMNS 329 Race, Gender, and Politics (also Government 329)
4 credits. Open to sophomores and juniors. Limited to 5 students. Not offered 1992–93.
M. Katzenstein.]

[WOMNS 335 Sexual and Social Differences in Late Nineteenth-Century German Literature and Culture (also German Studies 359 and Comparative Literature 335) #
4 credits.
C. A. Martin. Not offered 1992–93.
This course will investigate overlapping constructions of gender, sexuality, race, and class in late nineteenth-century German culture. Literary texts will provide the focus, but readings will also include philosophical, medical, psychoanalytic, and popular scientific writings. We will consider the work of such writers and thinkers as Freud, Hauptmann, Wedekind, Andreas-Salomé, Reventlow, Popp, Bebel, Krafft-Ebing, Weininger, George, and Dohm. Readings and discussions in English.]

[WOMNS 336/636 Comparative History of Women and Work (also ILR 636)
4 credits. Disc/sem.
Ileen DeVault. Not offered 1992–93.
This seminar will explore the similarities and differences among different cultures' assumptions about the work of women as well as women's experiences in varying work circumstances throughout history. Comparative examples will be taken from the United States, Europe, and the Third World.]

[WOMNS 346 German Women Writers in Translation (also German Studies 346)
4 credits. Not offered 1992–93.
C. A. Martin.
The course will involve careful readings of the work of specific authors, (authors to change each semester); feminist discussion of the concept of "women's writing"; and attention to the sociocultural and historical contexts in which the texts under discussion were written.]

[WOMNS 348 The Female Literary Tradition: Wollstonecraft to Woolf (also English 348) #
4 credits. Not offered 1992–93.
M. Jacobus.
A course designed to survey and investigate the nature of a British "female literary tradition" from the late eighteenth to the early twentieth centuries, read in the light of the rich and varied feminist criticism it has attracted. (Questions: What might constitute a female literary tradition? How is it transmitted, forgotten, recovered, or defined as "female" in the first place?) Starting with late eighteenth-century women novelists such as Inchbald, Burney, and Radcliffe, we will move by way of Wollstonecraft's writing to Austen, Edgeworth, and Mary Shelley. Mid-nineteenth-century authors will include writing by the Brontes, Gaskell, Barrett Browning, and George Eliot, as well as sensation novelists such as Braddon and Wood. We will look at some of the "new women" authors of the 1890s (Egerton, Schreiner) before turning to early twentieth-century novelists including Woolf, Radcliffe Hall, and H. D. The dual emphasis will be on an atypical or noncanonical selection of authors and texts, where possible, and on feminist literary criticism; a valuable (although not essential) prerequisite might be a 200- or 300-level course in major women novelists of the period covered, such as Austen, the Brontes, or Eliot, or in feminist literary theory.]

[WOMNS 349 Women in Medieval Literature (also German Studies 348 and Comparative Literature 349) #
4 credits. Not offered 1992–93.
B. Buettner.
A study of women and their roles in the social order as portrayed in the literature of the Middle Ages. Readings will illustrate the range of attitudes toward women from asceticism and antifeminism to their idealization in courtly love lyric and romance. We will examine woman's putative influence in literature, both positive and negative, on man and society and the debates over woman's "proper" attitude and role. Works in English translation will include a play by Hroswitha of Gandersheim, the Nibelungenlied, selected Mariological and mystical poems, courtly love lyric, Parzival, Tristan and Isolde, and The Book of the City of Ladies.]

WOMNS 357 American Families in Historical Perspective (also Sociology 359 and Human Development and Family Studies 359)
Spring. 3 credits. Prerequisite: Human Development and Family Studies 150 or one 200-level social science or history course. Students in endowed units must register for Women's Studies 357 or Sociology 359.
J. Brumberg.
An introduction to, and overview of, problems and issues in the historical literature on American families and the family life cycle. Reading and lectures will demonstrate the pattern of American family experience in past time, focusing on class, ethnicity, sex, and region as important variables. Analysis of the private world of the family in past time will deal with changing cultural conceptions of sexuality, sex roles, generational relationships, stages of life, and life events. Students will be required to do a major research paper on the history of their family, covering at least two generations and demonstrating their ability to integrate life-course development theory, data drawn from the social sciences, and historical circumstances.

WOMNS 362 Global Perspectives on Gender
Spring. 4 credits.
Staff.
The course will examine how forms of gender inequality have been shaped by international forces and structured by differences in national histories. The class will be taught by a rotating set of two faculty members from different departments. Contingent on the particular faculty directing the course, the class will consider such issues as cross-cultural perspectives on gender; the history of work and family life in different societies; the gendered division of labor in local, national, and international economies; the impact of colonialism; the organized efforts of women to define gender relations; the role of the state in constructing an engendered economy and polity. Students should consult with the main office of the Women's Studies Program for information about the faculty and the syllabus of the course offered each year.

[WOMNS 363 Representations of Women in Ancient Greece and Rome (also Classics 363) #
4 credits. Next offered spring 1994.
L. S. Abel, J. Ginsburg.
Classical authors created and left behind powerful images of women and of what women ought and ought not to be. These writers also provide fleeting insights into the real lives of women in antiquity. In this course, we will examine the ancient evidence to trace the origin of some Western attitudes about women and to analyze the assumptions that underlie the representations of women in ancient Greece and Rome. How are these images constructed and how do they work? How can we use the ancient evidence to assess the real lives and social roles of women in antiquity?]

[WOMNS 366 Lesbian Writing and Theory (also Government 366)
4 credits. Prerequisite: permission of instructor. Not offered 1992–93.
C. A. Martin.
This course will begin by investigating the histories and implications of the categories in the course title. Though the focus will change from year to year, there will be a strong emphasis on "lesbian writing" and theory since the late 1960s. We will consider the relations between lesbian and gay male writing and theory as well as theory and writing that addresses itself explicitly to the intersections of race, gender, sexuality, and class. Writers, critics, and theorists will include, but not be limited to Audre Lorde, Esther Newton, Mab Segrest, Barbara Smith, Cherrie Moraga, Gloria Anzaldúa, V. K. Aruna, Adrienne Rich, Teresa de Lauretis, Judith Butler, Diana Fuss, Martha Vicinus, Michael Foucault, Martin Duberman.]

WOMNS 384 Women and Unions (also ILR 384)
Fall. 4 credits.
I. DeVault.
This course will explore women's participation in the U.S. labor movement in the nineteenth and twentieth centuries. The class will cover issues such as women workers' relations with male-dominated union movements, the role of cross-class alliances of women in organizing women workers, interactions with radical parties and organizations, problems faced by women union leaders and activists, racial and ethnic differences in organizing, and the impact of societal stereotypes and expectations.

[WOMNS 390 The Fiction of Modern Hispanic Women (also Spanish 390) #
4 credits. Taught in Spanish. Not offered 1992–93.
D. Castillo.
This course will survey a representative sampler of novels and short stories by twentieth-century Hispanic women. We will be giving particular attention to typical themes and subject matter relating to women's experience and perspectives in the context of questions raised by recent feminist criticism. Readings will include works by Silvina Ocampo, Rosario Ferre, Susana Torres Molina, Carmen Martin Gaite, Carmen Gomez Ojea, Luisa Valenzuela, Cristina Peri Rossi, Mercedes Salisachs, and Albalucia Angel.]

[WOMNS 404 Women Artists (also History of Art 404)
4 credits. Prerequisite: permission of instructor. Auditing not permitted.
J. Bernstock. Not offered 1992–93.
This seminar will be devoted to a study of the work of women artists from antiquity to the present. The works of the most important women artists from each period will be studied in relation to the changing roles of women in society and to the art produced contemporaneously by men.

WOMNS 406 The Culture of Lives (also Anthropology 406) @
Spring. 4 credits.
K. March.
This seminar examines the insights provided by diverse personal narratives into both the particularities of individual lives and into the wider social and cultural forms within which those lives unfold. We look at the place of life histories in the historical development of anthropology as a discipline, in terms of both the theoretical and methodological concerns they raise. We focus upon the contemporary resurgence of interest in personal narratives as windows onto both the social or cultural construction of the person as well as heavily upon women's lives and their representations to contrast men's and women's accounts and

to underscore the special significance of women's narratives in anthropology.

[WOMNS 408 Gender Symbolism (also Anthropology 408) @
4 credits. Not offered 1992–93.
K. March.
This seminar looks at how cultural meaning is constructed about biological sex differences. We begin from the presumption that sex difference and gender are culturally defined as a system of categories and meanings interacting with people's cognitive, intellectual, and affective experience of their worlds. The seminar has two primary conceptual objectives: (1) to analyze the relations among gender symbols and (2) to explore the relations between these symbols and the social worlds of the people who believe in them.]

WOMNS 425 Gender Relations, Gender Ideologies, and Social Change (also Rural Sociology 425)
Fall. 3 credits
S. Feldman.
This course offers a comparative analysis of rural women's work in agriculture, domestic and household production, and forms of wage work and self-employment in both Third World and industrialized countries. Drawing on feminist and sociological theory and methods, the course examines gender ideologies, work-family linkages, responses to technological innovation, the transformation of the labor process, and the international division of labor as processes that restructure gender relations and challenge existing proscriptions of women's behavior.

WOMNS 426 Undergraduate Seminar in Early American History (also History 426) #
Fall. 4 credits.
M. B. Norton.
Topic for 1992: Religion, Gender, and Politics in Seventeenth-Century Anglo-America.

[WOMNS 428 Spirit Possession, Shamanism, Curing, and Witchcraft (also Anthropology 428) @
4 credits. Limited to 20 students. Prerequisite: background in anthropology or women's studies. Not offered 1992–93.
D. Holmberg.
An anthropological consideration of witchcraft, shamanisms, and cults of spirit possession, with special attention to the play of gender. Classic anthropological accounts of non-Western societies will be considered along with ethnographic and historical accounts of Western societies. The course also addresses general problems in the study of women and gender and the anthropology of myth, ritual, and symbolism.]

WOMNS 432 Fashion: Systems, Sign, and Fetish (also Society for the Humanities 402)
Fall. 4 credits.
J. Emberley.
In this seminar, we will endeavor to develop theoretical approaches to contemporary fashion and the fashion industry to understand the competing and conflicting symbolic and economic values ascribed to these phenomena. The course will examine several historical and cultural examples of fashion from a variety of theoretical perspectives, including semiotics, Marxism, feminism, and postcolonialism.

WOMNS 433 The Female Dramatic Tradition (also Theatre Arts 433)
Spring. 4 credits.
J. E. Gainor.
Is there a "female dramaturgy?" What is the female tradition in the theatre? The course will explore these questions through an investigation of texts by women dramatists, including Hrotsvitha, Aphra Behn, and Caryl Churchill, as well as theory by such critics as Sue Ellen Case and Jill Dolan.

[WOMNS 438 Female Adolescence in Historical Perspective, 1815–1960 (also HDFS 417 and History 458)
Spring. 3 credits. Limited to 25 students. Permission of instructor required. Not offered 1992–93.
J. Brumberg.
The changing nature of female adolescence in the United States is explored using nineteenth-century primary sources available in the Department of Manuscripts and University Archives. Olin Library multidisciplinary readings and discussions are designed to uncover the nature of women's childhood, patterns of authority within the family, cultural attitudes toward sexuality, female friendships, courtship patterns, and rites of passage into adulthood.]

WOMNS 443 Gender and War in European History (also History 443)
Fall. 4 credits.
R. Schulte.
This course will study the relationship of men and women in war and its transformation through war by looking at the traditional motif of the returning warrior in a variety of narratives, both fictional and historical, ranging from classical mythology to chronicles and literary sources of the Thirty Years' War and World War I to oral history reminiscences of World War II in Central Europe. Within the overall context of gender studies, this motif has recently been analyzed from anthropological and sociological as well as literary viewpoints, all of which will contribute to a complex interdisciplinary reading.

[WOMNS 445 Jane Austen, Elizabeth Gaskell, and George Eliot (also English 445) #
Spring. 4 credits. Not offered 1992–93.
J. Blackall.
A close focus on five masterworks of the nineteenth century—Austen's *Pride and Prejudice* and *Emma*; Gaskell's *Life of Charlotte Bronte* and *Wives and Daughters*; and Eliot's *Middlemarch*—with particular regard for the circumstances, biographical and social, from which these works emerged. We will examine these writers' perception of the institution of marriage; their delineation of the problem of attaining self-fulfillment and self-expression within a domestic and rural community, especially for women; and their concepts of a "heroine" and a "hero." Emphasis will be on reading and discussion. Participants will keep journals reflecting their personal responses to the books and their pursuit of chosen topics, these notes leading to one final essay of moderate length.]

[WOMNS 446 Gothic and Gender (also English 445)
4 credit hours. Seminar limited to 20. Prerequisite: a course at 300 level or above in literature or literary theory. Not offered 1992–93.
M. Jacobus.
A course focusing on the intersections of gothic fiction (by men and women) and gender issues between the late-eighteenth-century and the mid-nineteenth-century sensation novel. The emphasis will be on the gothic construction of gender as well as the definition and evolution of gothic modes and genre and on exploring and (where appropriate) contesting a variety of the psychoanalytic accounts (including gender-political accounts—whether specifically feminist or not). We will be reading some or all of the following novels by Walpole (*Castle of Otranto*), Diderot (*The Nun*), de Sade (*Justine*), and M. G. Lewis (*The Monk*), as well as the feminized (anti-)gothic tradition including Radcliffe (*Mysteries of Udolpho*), Austen (*Northanger Abbey*), Mary Shelley (*Frankenstein*), and Freud's Schreber (*Memoirs of my Nervous Illness*), ending with Wilkie Collins (*The Women in White*). Alongside fiction, we will consider classics of gothic criticism such as Freud's *Uncanny* as well as more recent critical accounts, whether their emphasis is on post-structuralism (Sedgwick's *The Coherence of Gothic Conventions*), feminine fantasy (Modleski's *Loving with Vengence*), or domestic ideology (Kate Ellis's *The Contested Castle*).]

WOMNS 450/650 The Lenses of Gender (also Psychology 450 and 650)
Fall. 4 credits. Prerequisite: Permission of instructor. Limited to 12 seniors and graduate students. No preregistration; interested students should attend first class session. Graduate students sign up for Psychology/Women's Studies 650.
S. Bem.
This seminar analyzes the ideological, institutional, and psychological mechanisms that are responsible for the social reproduction of male power in Western—and especially American—culture. It is interdisciplinary, covering material from biology, history, anthropology, law, sociology, psychology, psychiatry, philosophy, and feminist theory. Part one analyzes three important organizing principles or "cultural lenses" that have come to be embedded in the social institutions and the cultural discourses of Western culture: (a) biological essentialism; (b) androcentrism; and (c) gender polarization (including the stigmatizing of homosexuality). Part two analyzes how the individuals living within the context of these lenses are transformed from being male or female newborns to being "masculine" and "feminine" adults—how, in other words, the culture's gender lenses are subtly transferred from the practices of the culture to the psyche of the individual. Part three considers possibilities for social and personal change.

WOMNS 451 Women in Italian Renaissance Art (also Art History 450) #
Spring. 4 credits. Prerequisite: permission of instructor.
C. Lazzaro.
In this seminar, representations of women—biblical and historical heroines, mythological figures, and portraits, primarily in paintings, but also in prints and sculpture—will be examined in their social as well as artistic context. Among the topics to be discussed are moralizing stories directed at women that are represented on fifteenth-century cassoni, or marriage chests, and similar domestic paintings; Italian versions of the popular "power of women" subjects in Northern prints;

gender difference in the conventions of Renaissance portraiture; the representation of the female nude; the rise of mythological subjects and male delectation as a function of painting; allegories of chastity, love, and lust in painting and prints; the role of the female in sixteenth-century political allegory.

WOMNS 456 Edith Wharton, Willa Cather, and Eudora Welty (also English 456/656)

Fall. 4 credits.
J. F. Blackall.
A representative selection of the best fiction of three distinguished American women writers with particular regard for their representation of women in relation to environment, for their characteristic themes and materials, and for their practice of the craft of fiction. Readings: Wharton, *The House of Mirth, Summer, The Age of Innocence*, and selected short stories; Cather, *O, Pioneers!, A Lost Lady, The Professor's House*, and selected short stories; and Welty, *The Robber Bridegroom, The Golden Apples, The Optimist's Daughter*, and selected short stories. Discussion format with three essays.

WOMNS 463 The Politics of Contemporary Feminist Theory (also Government 463)

Fall. 4 credits.
N. Hirschmann.
For years the women's movement based its claim to equality on the assertion that men and women are the same. Recently, however, feminist theorists have argued that there are deep, fundamental differences between the sexes: for instances, do women and men view morality differently? What effect does reproduction have on female consciousness? Does women's work produce a particular epistemology, or "way of knowing"? How do gender, race, class, sexual orientation, etc., influence each other? Drawing on works from political science, psychology, sociology, literary criticism, and philosophy, we will examine a variety of contemporary methods and approaches to feminism, paying particular attention to the issue of "difference" and how claims of difference affect women's claims to equality. In the process, we will examine the "politics" of feminist theory, and what feminism has to offer political science as a discipline. Some familiarity with the methods of political theory is recommended, but not required.

WOMNS 466 Feminism and Gender Discrimination (also Government 466 and Law 648)

Fall. 4 credits.
K. Abrams.
This course will introduce students to the major schools of feminist legal theory, including equality theory, difference theory, dominance theory, and anti-essentialism. It will then use these theories as a framework for examining several areas in which the law has attempted to address gender-specific injuries. These will include the workplace (sexual harassment, regulation of fertility, work/family conflict), the family (abortion, surrogacy), and violence against women (rape, spousal abuse, pornography). The course will emphasize analysis and critique of present political and legal responses and formulation of alternative responses. Some previous exposure to legal materials (case law, statutes) is useful, but not required.

WOMNS 474 Black Women Writers: Theory in the Flesh (also English 464)

Spring. 4 credits.
H. Mullen.
Black women, while challenging feminism to acknowledge and explore difference among women, have also created a literature in which differences among black women, particularly differences of color and class, are meticulously observed and critically articulated. As collaborators in the creation of Afro-American culture, black women have also written perceptively about the precise inflections of gender that make differences in the experience of black women and black men. This course will focus on textual representations of color, class, and cultural differences within Afro-American communities, especially as these differences influence constructions of female identity in the texts of black women writers, including Nella Larsen, Gwendolyn Brooks, Toni Morrison, Alice Walker, Toni Cade Bambara, Paule Marshall, Adrienne Kennedy, Gayl Jones, Terry McMillan, and Andrea Lee.

[WOMNS 475 Feminist Literary Criticism (also English 475)

3 credits. Not offered 1992–93.
Mary Jacobus.
An introduction to the varieties of feminist literary criticism and theory currently practiced in America, drawing on recent anthologies such as *The New Feminist Criticism* and *Speaking of Gender*, ed. Showalter; *The (M)other Tongue*, ed. Brennan; *Conjuring*, ed. Pryse and Spillers; *French Feminist Thought*, ed. Moi; *Making a Difference*, ed. Greene and Kahn; *The Feminist Reader*, ed. Belsey; *Socialist Feminist Criticism*, ed. Newton. We will explore and question the practice and theoretical assumptions of feminist criticism in the past decade—psychoanalytic, Marxist, linguistic, reader-response, Black and Lesbian, Anglo-American, and Franglo-American. We will be particularly concerned with questions such as: What are the assumptions that underpin the concept of a specifically feminine literary practice or writing (écriture féminine)? How do questions of gender enter into interpretation? How is sexual difference constructed (socially, psychically, textually)? How do questions of racial difference and/or sexual preference enter into feminist criticism? Is there a politics of women's writing? What does it mean to invoke a (M)other tongue, and what are the politics of the pervasive maternal and matrilinear metaphors in feminist accounts of literature, literary tradition, and language? Though the main tests will be essays in feminist literary criticism and theory, we will also read a selection of (mainly nineteenth-century and twentieth-century) short works by women authors.]

[WOMNS 476 Women's Poetry (also English 476)

4 credits. Limited to 25 students. Prerequisite: permission of instructor. Not offered 1992–93.
D. Mermin.
A historical survey of the female poetic tradition in Britain and America, including such writers as Bradstreet, Dickinson, Bronte, Barrett Browning, Bishop, Brooks, and Plath.]

[WOMNS 481 Latin American Women Writers (also Spanish 492 and Comparative Literature 482) @

4 credits. Taught in English. Not offered 1992–93.
D. Castillo.
This course will provide a sampler of novels and short stories by and about Latin American women. We will look at the question of self-construction and issues such as the social and political concerns involved in a specifically Latin American feminine identity. All works will be read in translation (Romance Studies students should read originals of the two works from the Spanish). Authors may include writers like Luisa Valenzuela (Argentina) and Rigoberta Menchů (Guatemala), Helena Parente Cunha and Clarice Lispector (Brazil), Helena María Viramontes and the Anzaldůa/Moraga anthology *This Bridge Called My Back* (U.S.A.), and Simone Schwarz-Bart (Guadalupe).]

WOMNS 491 Virginia Woolf (also English 491)

Fall. 4 credits.
M. Hite.
This seminar will consider six major novels—*Mrs. Dalloway, To the Lighthouse, Orlando, The Waves, The Years* (along with Woolf's unfinished novel/essay *The Pargiters*), and *Between the Acts*—along with *A Room of One's Own, Three Guineas*, and a selection of the shorter essays. We will also look at relevant material from the diaries and occasionally from the letters. Participants will give at least two presentations over the course of the semester and will be expected to participate regularly in discussions. Some short in-class writings, two major papers (10–15 pages).

WOMNS 493 French Feminisms (also French 493)

Fall. 4 credits.
N. Furman.
This course will examine the political, theoretical, and literary concerns of contemporary French writers who have addressed "la question de la femme/la question du fêminin." Readings will include representative texts by Simone de Beauvoir, Monique Wittig, Julia Kristeva, Jacques Lacan, Luce Irigaray, Jacques Derrida, and Hélène Cixous. Taught in English.

WOMNS 499 Directed Study

Fall or spring. Variable credit. Prerequisites: one course in women's studies and permission of a faculty member of the Women's Studies Program Board.
Hours to be arranged. Staff.

[WOMNS 530 Womanist Writing in Africa and the Caribbean (also Africana 530)

Fall. 4 credits. Not offered 1992–93.
A. Adams.
Theoretical essays on the nature, relevance, and articulation of feminist thought from African and Caribbean writers will complement literary texts. Gender issues, as manifested both at home and in emigrant situations abroad, will be examined in texts by such writers as Sistren, Conde, Dangarembga, Aidoo, Warner-Vieyra, Ba, Emecheta, Kincaid, and W. Mandela. (Francophone works may be read in the original by individuals who so desire.)]

WOMNS 613 The Political Economy of Women and Work (also City and Regional Planning 613)

Fall. 3 credits.
L. Beneria.
This course focuses on different approaches to the analysis of women's work in the household and the labor market from an economic and feminist perspective. Topics include

household theory and the gender division of labor in the home and the labor market; labor force participation; wage differentials, segregation, labor market segmentation, and discrimination; class, race, and gender issues; comparable worth and other labor market policies, gender and economic restructuring; family politics, demography and social change. The empirical material in the course concentrates mostly, but not exclusively, on the United States.

WOMNS 614 International Development and Women (also City and Regional Planning 614)
Spring. 3 credits.
L. Beneria.
A continuation of Women's Studies 613. The focus here is on international development issues and on the location of women in the development process, with an emphasis on the Third World and on differences and commonalities between regions and countries. The analysis is placed within the context of the global economy and it emphasizes issues related to cross-cultural perspectives on gender, household organization, the division of labor, labor market dynamics, the conditions of women's employment, and current topics such as household strategies and structural adjustment policies.

[WOMNS 621 Lesbian, Gay, and Bisexual Studies
Fall. 4 credits.
C. A. Martin. Not offered 1992–93.
The purpose of this seminar is twofold: (1) to explore recent work in the field of lesbian and gay studies with particular emphasis on cultural theory; and (2) to provide graduate students with the opportunity to pursue their individual research projects in a collaborative setting. The first part of the semester will be devoted to a discussion of critical debates and texts in this emerging field, and the second half to students' presentations of their work.]

[WOMNS 626 Graduate Seminar in the History of American Women (also History 626)
Fall. 4 credits. Limited to graduate students.
M. B. Norton. Not offered 1992–93.
A reading and research seminar intended for graduate students. Major works in American women's history will be carefully scrutinized, and each student will prepare a lengthy research paper.]

WOMNS 631 Gender and Culture (also Anthropology 621)
Fall. 4 credits.
K. March.
Extended consideration of the anthropological issues surrounding sex and gender introduced in ANTHR/WOMNS 321. The discussion seminar portion of this course will emphasize contemporary theories of gender within anthropology and build specifically toward the formulation of important research problems in the field. Graduate students only.

WOMNS 633 Women Writers in the Middle Ages (also English 633)
Fall. 4 credits.
A. Galloway.
This new course will study women writers of the Middle Ages, while examining some of the methodologies—medieval and modern—for assessing these women's works and lives. The first weeks will be spent reading Marie de France, a selection of poems "praising" and "blaming" women and marriage, surveying medieval "theories about femininity"—including misogyny of the more obvious and perennial varieties—and putting beside these selected modern essays. The balance of the course will concentrate on the works and contexts of women writers in the later Middle Ages, especially Margery Kempe, Julian of Norwich, Catherine of Siena, and Christine of Pisan, interlacing study of these with some excerpts from male writers in the same general traditions. Study of the later writers will include emphasizing the ways that the women writers interacted with their male intellectual peers and with their literary, religious, and philosophical traditions; we will seek to define within these living and intellectual contexts the kinds of authority and vision these women developed. Time permitting, some women writers of the sixteenth century may be included.

[WOMNS 638 Contemporary German Women Writers (also German Literature 638)
4 credits. Not offered 1992-93.
I. Ezergailis.]

[WOMNS 660 Gender in Nineteenth-Century America (also English 661)
4 credits.
S. Samuels. Not offered 1992–93.
A study of the relation between historical experience and literary texts. We will examine from the perspectives of both historical and literary analysis the rise of women writers, the novel's preoccupation with conflicts between men and women, the cultural uses of feminism and antifeminism, and the impact of the new woman. Bringing traditional literary texts—novels and poetry—into dialogue with "nonliterary" writings like journalism, political treatise, social reform manifestos, and etiquette books, we will draw on the methods and theories of cultural history and literary criticism to ask how gender relations and the history of women bear on the plots, discourses, and images of literary texts. A tentative reading list would include Susannah Rowson's *Charlotte Temple*, Lydia Maria Child's *The Mother's Book*, Catherine Beecher's *A Treatise on Domesticity*, Nathaniel Hawthorne's *The Blithedale Romance*, Harriet Beecher Stowe's *Uncle Tom's Cabin*, Herman Melville's *Pierre*, poems by Emily Dickinson and Walt Whitman.]

[WOMNS 685 Seminar in Sex Differences and Sex Roles (also Psychology 685 and Sociology 685)
4 credits. Prerequisite: permission of instructor. Not offered 1992–93.
S. Bem.]

[WOMNS 690 Feminist Criticism (also German Studies 690)
4 credits. Open to qualified undergraduates with permission of instructor. Reading knowledge of German recommended but not required.
C. A. Martin. Not offered 1992–93.
This course is designed to explore developments in feminist literary theory with particular attention to the field of German literature. We will consider competing critical strategies and their political implications by working through different readings of specific literary texts and by raising questions about the implications for feminism of competing critical strategies in the general field of literary theory; the relations between feminism and established critical schools; the tension in feminist Germanistik between critical attention to the "male canon" and the construction of a female literary tradition; the impact on German feminism(s) of their translations of French and American work; the impact and treatment of the Nazi period; the effects of the East-West divide on development in Germany; the impact on feminist literature and criticism of Third World women in Germany; and approaches in Germany to imperialism and racism.]

WOMNS 692 Hispanic Feminisms (also Romance Studies 690)
Spring. 4 credits. Taught in Spanish.
D. Castillo.
This seminar is designed to explore the interrelationship of feminist literary theory and the narrative production of the Hispanic world. In this inquiry, we will be developing feminist critical methodologies (based on readings of essays by thinkers such as Castellanos, and Glantz) and defining strategies or possibilities for feminist criticism(s). Finally, we will study the ways in which feminist analyses of literature alter our readings of texts by men (Isaacs, Cortázar, Onetti, García Lorca) as well as by women (Pardo Bazán, Tusquets, Valenzuela, Garro), and how they change our conception of criticism and the task of the critic.

WOMNS 699 Topics in Women's Studies
Fall or spring. Variable credits.
Staff.
Independent reading course for graduate students on topics not covered in regularly scheduled courses. Students develop a course of readings in consultation with a faculty member in the field of Women's Studies who has agreed to supervise the course work.

[WOMNS 705 Feminist Literary Theory (also English 705)
4 credits. Not offered 1992–93.
M. Jacobus.]

[WOMNS 733 Literary Anti-Feminism (also English 733)
4 credits. Not offered 1992–93.
L. Brown.]

WOMNS 772 Advanced Topics on International Development and Women (also City and Regional Planning 772)
Spring. 4 credits.
L. Beneria.
A seminar to explore theoretical and empirical issues of interest to master's and Ph.D. degree students working on topics related to gender and international development. The focus is on a few narrow topics–such as the gender effects of the foreign debt crisis, the formal sector and women's work, and gender aspects in demographic change–to be explored in depth in preparation for research and thesis writing. Students are encouraged to explore and exchange ideas as well as to provide mutual support and criticism.

Related Courses in Other Departments

CRP 415 Gender Issues in Planning and Architecture

CE&H 411 Time as a Human Resource

GERST 754 German Women Writers of the Fin de Siêcle

HDFS 150 The Family in Modern Society

HDFS 354 The Family in Cross-cultural Perspective

HDFS 358 Theories of Adult Interpersonal Relationships

HDFS 456 Families and Social Policy

HDFS 650 Contemporary Family Theory and Research

ILR 366 Women at Work

TXA 245 Dress: A Reflection of American Women's Roles

Writing Program

See "John S. Knight Writing Program."

FACULTY ROSTER

Abrams, Kathryn, J. D., Yale Law. Assoc. Prof., Ethics and Public Life

Abrams, Meyer H., Ph.D., Harvard U. Class of 1916. Professor of English Emeritus, English

Abruna, Hector D., Ph.D., U. of North Carolina at Chapel Hill. Prof., Chemistry

Adams, Anne, Ph.D., U. of Michigan. Assoc. Prof., Africana Studies and Research Center

Adams, Barry B., Ph.D., U. of North Carolina. Prof., English

Agard, Frederick B., Ph.D., Princeton U. Prof. Emeritus, Modern Languages and Linguistics

Agawu, V. Kofi, Ph.D., Stanford U. Assoc. Prof., Music

Ahl, Frederick M., Ph.D., U. of Texas at Austin. Prof., Classics

Albrecht, Andreas C., Ph.D., U. of Washington. Prof., Chemistry

Alexander, James P., Ph.D., U. of Chicago. Asst. Prof., Physics/LNS¶

Allmendinger, Richard W., Ph.D., Stanford U. Assoc. Prof., Geological Sciences/INSTOC#

Ambegaokar, Vinay, Ph.D., Carnegie Inst. of Technology. Prof., Physics/LASSP*

Ammons, Archie R., B.S., Wake Forest Coll. Goldwin Smith Professor of Poetry, English

Anderson, Benedict R., Ph.D., Cornell U. Aaron L. Binenkorb Professor of International Studies, Government

Archer, Richard J., M.A., U. of Missouri at Kansas City. Asst. Prof., Theatre Arts

Arroyo, Ciriaco M., Ph.D., U. of Munich (Germany). Emerson Hinchliff Professor of Spanish Literature, Romance Studies/Comparative Literature

Ascher, Robert, Ph.D., U. of California at Los Angeles. Prof., Anthropology

Ashcroft, Neil W., Ph.D., Cambridge U. (England). Horace White Professor of Physics, Physics/LASSP*

Austin, William W., Ph.D., Harvard U. Given Foundation Professor of Musicology Emeritus, Music

Bacharach, Samuel B., Ph.D., U. of Wisconsin. Assoc. Prof. Industrial and Labor Relations/Sociology

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Banes, Sally, Ph.D., New York. U. Assoc. Prof., Theatre Arts

Barazangi, Muawia, Ph.D., Columbia U. Prof., Geological Sciences/INSTOC#

Barbasch, Dan, Ph.D., U. of Illinois. Prof., Mathematics

Barzman, Karen-Edis, Ph.D., Johns Hopkins U. Asst. Prof., History of Art

Bassett, William A., Ph.D., Columbia U. Prof., Geological Sciences

Bathrick, David, Ph.D., U. of Chicago. Prof., German Literature and Theatre Arts

Bauer, Simon H., Ph.D., U. of Chicago. Prof. Emeritus, Chemistry

Baugh, Daniel A., Ph.D., Cambridge U. (England). Prof., History

Beckwith, Steven V. W., Ph.D., California Inst. of Technology. Prof., Astronomy/CRSR†

Begley, Tadhg P., Ph.D., California Inst. of Technology. Asst. Prof., Chemistry

Bell, Eleanor O., Ph.D., U. of California at Berkeley. Asst. Prof., Sociology

Bem, Daryl J., Ph.D., U. of Michigan. Prof., Psychology

Bem, Sandra L., Ph.D., U. of Michigan. Prof., Psychology/Women's Studies

Beneria, Lourdes, Ph.D., Columbia U. Prof., City and Regional Planning/Women's Studies

Bereaud, Jacques, Doctorat d'Univ., U. of Lille (France). Prof., Romance Studies

Berger, Anne, Ph.D., Paris VII (France). Assoc. Prof., Romance Studies

Berkelman, Karl, Ph.D., Cornell U. Prof., Physics/LNS¶

Bernal, Martin G., Ph.D., Cambridge U. (England). Prof., Government/Near Eastern Studies

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Bethe, Hans, Ph.D., U. of Munich (Germany). John Wendell Anderson Professor of Physics Emeritus, Physics

Billera Louis J., Ph.D., City U. of New York. Prof., Mathematics/Operations Research and Industrial Engineering

Bilson, Malcolm, D.M.A., U. of Illinois. Frederic J. Whiton Professor of Music, Music

Bird, John M., Ph.D., Rensselaer Polytechnic Inst. Prof., Geological Sciences

Birman, Kenneth P., Ph.D., U. of California at Berkeley. Assoc. Prof., Computer Science

Bishop, Jonathan P., Ph.D., Harvard U. Prof., English

Bittman, Dina, Ph.D., U. of Wisconsin at Madison. Asst. Prof., Computer Science

Blackall, Jean F., Ph.D., Harvard U. Prof., English

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Bloom, Bard, Ph.D., Massachusetts Inst. of Technology. Asst. Prof., Computer Science

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Borneman, John W., Ph.D., Harvard U. Asst. Prof., Anthropology

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Bowers, John S., Ph.D., Massachusetts Inst. of Technology. Prof., Modern Languages and Linguistics

Boyd, Richard N., Ph.D., Massachusetts Inst. of Technology. Prof., Philosophy/Science and Technology Studies

Bramble, James H., Ph.D., U. of Maryland. Prof., Mathematics

Brann, Ross, Ph.D., New York U. Assoc. Prof., Near Eastern Stuides

Brazell, Karen W., Ph.D., Columbia U. Prof., Japanese Literature (Asian Studies)

Breiger, Ronald L., Ph.D., Harvard U. Prof., Sociology

Bronfenbrenner, Urie, Ph.D., U. of Michigan, Jacob Gould Schurman Professor Emeritus, Human Ecology/Psychology

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Brown, Larry D., Ph.D., Cornell U. Prof., Geological Sciences/INSTOC#

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Grimes, Joseph E., Ph.D., Cornell U. Prof. Emeritus, Modern Languages and Linguistics
Groos, Arthur, Ph.D., Cornell U. Prof., German Literature/Medieval Studies
Gross, Leonard, Ph.D., U. of Chicago. Prof., Mathematics
Grossvogel, Anita V., Ph.D., Cornell U. Assoc. Prof., Romance Studies
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Harwit, Martin O., Ph.D, Massachusetts Inst. of Technology. Prof. Emeritus, Astronomy/ CRSR†
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Hatcher, Allen, Ph.D., Stanford U. Prof., Mathematics
Hay, George A., Ph.D., Northwestern U. Prof., Economics/Law
Hayes, Donald P., Ph.D., U. of Washington. Prof., Sociology
Haynes, Martha P., Ph.D., Indiana U. Prof., Astronomy/NAIC‡
He, Zheng-Xu, Ph.D., Princeton U. Asst. Prof., Mathematics
Hays, Michael D., Ph.D., U. of Minnesota. Prof., Theatre Arts
Henderson, David W., Ph.D., U. of Wisconsin. Prof., Mathematics
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Henley, Christopher L., Ph.D., Harvard U. Asst. Prof., Physics/LASSP*
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Herrin, W. Lamar, Ph.D., U. of Cincinnati. Prof., English
Herter, Terry L., Ph.D., U. of Rochester. Assoc. Prof., Astronomy/CRSR†
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Hirschman, Nancy, Ph.D., Johns Hopkins U. Asst. Prof. Government
Hite, Molly, Ph.D., U. of Washington. Assoc. Prof., English
Ho, Wilson, Ph.D., U. of Pennsylvania. Assoc. Prof., Physics/LASSP*
Hockett, Charles F., Ph.D., Yale U. Prof. Emeritus, Modern Languages and Linguistics/Anthropology
Hodes, Harold, Ph.D., Harvard U. Assoc. Prof., Philosophy
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Vernon, Kathleen M., Ph.D., U. of Chicago. Asst. Prof., Romance Studies
Veverka, Joseph F., Ph.D., Harvard U. Prof., Astronomy/CRSR†
Vogtmann, Karen L., Ph.D., University of California at Berkeley. Assoc. Prof., Mathematics
Volman, Thomas P., Ph.D., U. of Chicago. Assoc. Prof., Archaeology
Wahlbin, Lars B., Ph.D., U. of Göteborg (Sweden). Prof., Mathematics
Waite, Geoffrey C. W., Ph.D., Princeton U. Assoc. Prof., German Literature
Waldron, Jeremy J., P.D.Phi., Oxford U. (England). Assoc. Prof., Government
Walker, Henry A., Ph.D., Stanford U. Prof., Sociology
Wan, Henry Y., Jr., Ph.D., Massachusetts Inst. of Technology. Prof., Economics
Washington, Margaret, Ph.D., U. of California at Davis. Assoc. Prof., History
Wasserman, Ira M., Ph.D., Harvard U. Assoc. Prof., Astronomy/CRSR†
Waugh, Linda R., Ph.D., Indiana U. Prof., Modern Languages and Linguistics/ Comparative Literature/Romance Studies
Webster, James, Ph.D., Princeton U. Prof., Music Weil, Rachel, Ph.D., Princeton U. Asst. Prof., History
Weil, Rachel, Ph.D., Princeton U. Asst. Prof., History
Weiss, John H., Ph.D., Harvard U. Assoc. Prof., History
West, James E., Ph.D., Louisiana State U. Prof., Mathematics
Wetherbee, Winthrop, Ph.D., U. of California at Berkeley. Avalon Professor of English and Medieval Studies, English/Medieval Studies/Comparative Literature
White, William M., Ph.D., U. of Rhode Island. Assoc. Prof., Geological Sciences
Whitehead, Jane K., Ph.D., Yale U. Asst. Prof., Classics
Whitman, John B., Ph.D., Harvard U. Asst. Prof., Modern Languages and Linguistics
Widom, Benjamin, Ph.D., Cornell U. Goldwin Smith Professor of Chemistry, Chemistry
Wiesenfeld, John R., Ph.D., Case Inst. of Technology. Prof., Chemistry
Wilcox, Charles F., Jr., Ph.D., U. of California at Los Angeles. Prof., Chemistry
Williams, L. Pearce, Ph.D., Cornell U. John Stambaugh Professor of History, Science and Technology Studies
Williams, Robin M., Jr., Ph.D., Harvard U. Henry Scarborough Professor of Social Sciences Emeritus, Sociology
Wilson, Robert R., Ph.D. , U. of California at Berkeley. Prof. Emeritus, Physics
Wilson, Ron, B.G.S., Wichita State U. Asst. Prof., Theatre Arts
Wissink, Jennifer, Ph.D., U. of Pennsylvania. Asst. Prof., Economics
Wolczanski, Peter T., Ph.D., California Inst. of Technology. Todd Professor of Chemistry, Chemistry
Wolff, John U., Ph.D., Yale U. Prof., Modern Languages and Linguistics
Wolters, Oliver W., Ph.D., U. of London (England). Goldwin Smith Professor of Southeast Asian History Emeritus, History
Wong, Shelley, Ph.D., U. of California at Berkeley. Asst. Prof., English
Wood, Allen W., Ph.D., Yale U. Prof., Philosophy
Wyatt, David K., Ph.D., Cornell U. Prof., History
Yan, Tung-Mow, Ph.D., Harvard U. Prof., Physics/LNS¶
Yennie, Donald R., Ph.D., Columbia U. Prof., Physics/ LNS¶
Young, Martie W., Ph.D., Harvard U. Prof., History of Art
Zaslaw, Neal A., Ph.D., Columbia U. Prof., Music
Zec, Draga, Ph.D., Stanford U. Asst. Prof., Modern Languages and Linguistics
Zax, David B., Ph.D., U. of California at Berkeley. Asst. Prof., Chemistry
Zhou, Kenneth Xueguang, Ph.D., Stanford U. Asst. Prof., Sociology

*Laboratory of Atomic and Solid State Physics.
†Center for Radiophysics and Space Research.
‡National Astronomy and Ionosphere Center.
¶Laboratory of Nuclear Studies.
#Institute for the Study of the Continents.

DIVISION OF BIOLOGICAL SCIENCES

The Division of Biological Sciences provides a unified curriculum for undergraduate majors enrolled in either the College of Agriculture and Life Sciences or the College of Arts and Sciences. Courses in biological sciences are integral to many disciplines and are basic requirements in many schools and colleges at Cornell.

Graduate study in the biological sciences is administered by more than a dozen specialized fields within the Graduate School, as described in the Announcement of the Graduate School.

ORGANIZATION

The Division of Biological Sciences is composed of seven sections: Biochemistry, Molecular and Cell Biology; Ecology and Systematics; Genetics and Development; Microbiology; Neurobiology and Behavior; Physiology; Plant Biology; and, in addition, the L. H. Bailey Hortorium and the Shoals Marine Laboratory.

The offices, research laboratories, and classrooms of biology faculty members are located in many different buildings on the campus, primarily in the Colleges of Agriculture and Life Sciences, Arts and Sciences, and Veterinary Medicine.

Student services are provided by the division's Office for Academic Affairs and the Behrman Biology Center, both located in Stimson Hall, where academic advice, information on biological sciences course offerings, other important information, and counseling are available for undergraduates. The Office for Academic Affairs also follows the progress of biology majors and works closely with faculty advisers. Additional services and resources of the Biology Center include academic program planning, tutoring, lecture tapes, examination files, and information on undergraduate research opportunities. The center has comfortable areas for studying and relaxing.

The Shoals Marine Laboratory, a cooperative venture with the University of New Hampshire, is located on Appledore Island in the Gulf of Maine. Its base office in Stimson Hall provides advising and career counseling for students interested in the marine sciences and administers the SEA Semester program for Cornell students pursuing studies at Woods Hole or aboard the schooner *Westward* or brigantine *Corwith Cramer*.

FACULTY

P. J. Bruns, director; H. T. Stinson, associate director; E. Adkins-Regan, K. K. Adler, C. F. Aquadro, W. J. Arion, R. Barker, A. H. Bass, D. M. Bates, A. Bensadoun, K. W. Beyenbach, A. W. Blackler, S. E. Bloom, R. Booker, A. C. Borror, A. P. Bretscher, W. J. Brown, W. R. Butler, J. M. Calvo, R. R. Capranica, B. F. Chabot, J. L. Cisne, R. A. Corradino, W. L. Crepet, P. J. Davies, J. I. Davis, T. E. Dawson, A. Dobson, J. J. Doyle, S. E. Ealick, T. Eisner, S. T. Emlen, P. P. Feeny, G. W. Feigenson, R. H. Foote, J. E. Fortune, T. D. Fox, M. A. Geber, W. C. Ghiorse, J. Gibson, Q. H. Gibson, R. F. Gilmour, M. L. Goldberg, C. H. Greene, N. G. Hairston, B. P. Halpern, O. P. Hamill, M. R. Hanson, R. G. Harrison, R. M. Harris-Warrick, C. D. Harvell, J. D. Helmann, L. A. Heppel, G. P. Hess, P. C. Hinkle, C. D. Hopkins, K. A. Houpt, T. R. Houpt, R. W. Howarth, S. H. Howell, H. C. Howland, R. R. Hoy, T. C. Huffaker, A. T. Jagendorf, P. A. Karplus, M. N. Kazarinoff, E. B. Keller, K. J. Kemphues, K. A. R. Kennedy, L. V. Kochian, R. P. Korf, T. A. LaRue, R. L. Last, A. C. Leopold, S. A. Levin, G. E. Likens, J. T. Lis, E. R. Loew, M. A. Luckow, R. E. McCarty, D. K. McClearn, A. R. McCune, J. M. Fessenden MacDonald, R. J. MacIntyre, W. H. Mark, P. L. Marks, J. K. Moffat, R. P. Mortlock, J. B. Nasrallah, K. J. Niklas, K. C. Nixon, T. G. Owens, D. J. Paolillo, M. V. Parthasarathy, D. Pimentel, T. R. Podleski, F. H. Pough, A. G. Power, W. B. Provine, A. Quaroni, M. E. Richmond, J. W. Roberts, D. Robertshaw, R. B. Root, M. J. Rossman, J. B. Russell, M. M. Salpeter, A. M. Schneiderman, T. D. Seeley, D. I. Shalloway, P. W. Sherman, R. B. Silver, R. M. Spanswick, D. B. Stern, V. J. Stewart, D. N. Tapper, J. F. Thompson, R. Turgeon, B.-K. Tye, S. Via, V. M. Vogt, C. Walcott, R. H. Wasserman, R. O. Wayne, W. W. Webb, N. F. Weeden, Q. D. Wheeler, D. B. Wilson, S. C. Winans, D. W. Winkler, M. F. Wolfner, J. F. Wootton, R. Wu, S. A. Zahler, S. H. Zinder

Other Teaching Personnel

G. Albrecht, R. R. Alexander, R. A. Calvo, M. L. Cordts, C. Eberhard, P. R. Ecklund, M. F. Ferger, J. C. Glase, J. M. Griffiths, J. B. Heiser, C. H. McFadden, S. Merkel, C. M. Rehkugler, H. C. Reiss

DISTRIBUTION REQUIREMENT

In the College of Agriculture and Life Sciences, the biological sciences distribution requirement (Group B) is for a minimum of 9 credits, including at least 6 credits of introductory biology satisfied by Biological Sciences 109–110,105–106, or 101 and 103 plus 102 and 104, or 107–108 or any combination of the first term of one sequence and the second term of another. Advanced placement in biology with a score of 4 or 5 (6 or 8 credits, respectively) satisfies the requirement for introductory biology. The additional credits may be satisfied by any biological sciences courses *except Biological Sciences 152, 200, 202, 205, 206, 208, 209, 212, 301, or 367.*

For College of Arts and Sciences students matriculating before fall 1992, the biological sciences distribution requirement is for a two-semester introductory biology sequence selected from Biological Sciences 109–110,105–106, or 101 and 103 plus 102 and 104, or 107–108 or any combination of the first term of one sequence and the second term of another. An Advanced Placement score of 4 or 5 fulfills one-half the distribution requirement. Students must take an upper-level biology course to complete the distribution requirement in biological sciences. The remainder of the distribution requirement may be satisfied by an upper-level course (200+) offered by the Division of Biological Sciences *other than Biological Sciences 152, 200, 202, 205, 206, 208, 209, 301, or 367*; Anthropology 101; or Chemistry 222 or any combination of the first term of one sequence and the second term of another.

For College of Arts and Sciences students matriculating fall 1992 or later, the following courses can be used toward fulfillment of the physical and biological sciences distribution requirements: 160, 201, 207, 212, 246, 275 or a *two-semester introductory biology sequence* selected from 109–110, 105–106, or 101 and 103 plus 102 and 104, or 107–108, or a combination of the first term of one sequence and the second term of another. Advanced placement in biology with a score of 4 or 5 (6 or 8 credits, respectively) may be applied to the Group 1 distribution area in accordance with regulations stipulated by the Arts College. The following courses may not be used to fulfill the Group 1 distribution requirement in biological sciences: Bio Sci 152, 200, 202, 205, 206, 208, 209, 301, or 367.

In the College of Human Ecology, the natural sciences distribution requirement is for at least 6 credits selected from Biological Sciences 109–110, 101 and 103 plus 102 and 104, 105–106 or 107–108 or from specified courses in chemistry or physics. Advanced placement in biology with a score of 4 or 5 (6 or 8 credits, respectively) also satisfies the distribution requirement in the natural sciences.

Note: Biological Sciences 101–102–103–104 should be taken as a unit by students of any college except those with advanced placement credit.

Switching from one introductory biology sequence to another at midyear may not be possible because of variation in presentation of topics. Students must receive permission of the instructor to switch sequences. Taking sequences in reverse or inconsecutive order is strongly discouraged.

THE MAJOR

The Division of Biological Sciences offers a major in biological sciences to students enrolled in either the College of Agriculture and Life Sciences or the College of Arts and Sciences. The undergraduate program is coordinated for students in both colleges through the division's Office for Academic Affairs, where students submit their applications to the major and obtain biology faculty advisers.

During the second semester of the sophomore year, all students who intend to major in biological sciences must apply for acceptance into the major with the associate director for academic affairs, in 200 Stimson Hall. Students in the College of Agriculture and Life Sciences who were admitted directly to the major complete the application process to declare a program of study area and to assure satisfactory progress toward completion of the major. Acceptance into the major requires completion of the course sequences in introductory biology, chemistry, and mathematics (see requirements 1–3 below), plus one semester of organic chemistry lectures. In addition, a 2.75 Cornell cumulative grade-point average is required for final acceptance into the major except for those students admitted directly to the major as freshmen (College of Agriculture and Life Sciences students only) or as transfers. Students in the process of completing these prerequisites for admission to the major may be accepted on a *provisional* basis. Final acceptance into the major is required for graduation with a biological sciences major. It is the student's responsibility to assure that final acceptance has been granted.

Whenever possible, students should include the introductory biology, chemistry, and mathematics sequences in their freshman schedule and complete the organic chemistry lecture course in their sophomore year. Students are not encouraged to continue with the major in biological sciences unless performance in these four subjects gives evidence of capacity to perform satisfactorily at a more advanced level.

The requirements for the biological sciences major are listed below. These courses should be taken for a letter grade, unless the course is offered for S-U grades only.

1) **Introductory biology for majors** (one year): Biological Sciences 101 and 103 plus 102 and 104, or 105–106. Biological Sciences 107–108, offered during the eight-week Cornell Summer Session for 8 credits, also satisfies the introductory biology requirement for majors. Students may choose to accept advanced placement if they have received a score of 5 on the Advanced Placement Examination of the College Entrance Examination Board (CEEB). Students with a score of 4 must fulfill the introductory biology requirement by taking Biological Sciences 101–102, 101 and 103, 102 and 104, or 103–104. These students should consult information available in the course office (1140 Comstock Hall) and in the Biology Center (216 Stimson Hall) to determine which semester to take to complete the introductory biology requirement. For students in doubt, completion of Biological Sciences 101 and 103 is advised. These students receive a total of 8 introductory biology credits (4 AP credits plus 4 course credits).

2) **General chemistry** (one year): Chemistry 207–208,* or 215–216,* or 103–104.

3) **College mathematics** (one year): Two semesters of calculus (Mathematics 111–112, 191–192, or their equivalents) or Mathematics 105 and one semester of calculus. Education 115 may not be used to fulfill any part of this requirement.

4) **Organic chemistry**: Chemistry 253 and 251, or 253 and 301, or 357–358 and 251, or 357–358 and 301, or 359–360 and 251, or 359–360 and 301.

5) **Physics:** Physics 207–208,* 112–213,* or 101–102. Those who take Physics 112–213 are advised to complete Physics 214 as well.

6) **Genetics:** Biological Sciences 281.

7) **Biochemistry:** Biological Sciences 330 or 331.

8) **Evolutionary Biology:** Biological Sciences 378.

9) **A program of study** selected from the outline below.

10) **Foreign language:** students registered in the College of Agriculture and Life Sciences must satisfy the foreign language requirement of the Division of Biological Sciences by (a) presenting evidence of successful completion of three or more years of study of a foreign language in high school or (b) attaining a score of 560 or more on the reading portion of the College Entrance Examination Board achievement test or (c) achieving "qualification" status in a language as defined by the College of Arts and Sciences or (d) successfully completing at least 6 college credits in a foreign language. Students registered in the College of Arts and Sciences must satisfy the language requirement as stated by that college.

*Since modern biology has an important physical and quantitative orientation, students are advised to undertake basic science courses that emphasize this approach. Asterisks in the above list indicate the courses that provide this orientation, but all courses listed are acceptable.

Although not required for the biological sciences major, a course in statistics is recommended for students planning graduate study or a research career. Students should consult their faculty advisers when choosing appropriate courses in statistics.

Programs of Study and Requirements

As noted in the list of requirements above, students accepted into the biological sciences major must choose a program of study. The program of study requirements are designed to help students achieve depth in one area of biology while ensuring that the selected advanced courses form a coherent and meaningful unit. Because of the flexibility allowed in satisfying these requirements, students should consult their faculty advisers. The possible programs of study are listed below.

1) *Animal Physiology and Anatomy:* Bio S 311, Introductory Animal Physiology, Lectures; Bio S 313, Histology: The Biology of Tissues; Bio S 316, Cellular Physiology; and Bio S 319, Animal Physiology Experimentation. The Program of Study in Animal Physiology and Anatomy emphasizes whole-animal, tissue, and cell physiology, and provides considerable opportunity for studies using live animals. It is intended especially for students contemplating careers in biomedical practice or research.

2) *Biochemistry:* Quantitative Chemistry (Chemistry 300 or completion of Chemistry 215–216 for the general chemistry requirement for the major); a minimum of four credits of organic chemistry laboratory (Chemistry 301–302 or 251–252–302 or 301 or 251–252); a biochemistry laboratory course (Bio S 638 or 430 or 630); and Physical Chemistry (Chemistry 389–390.1 or 287–288 or 287–390.2). Note that Chemistry 288 is designed for biologists. It is recommended that students interested in graduate work in biochemistry take the more rigorous organic chemistry and physics sequences (Chemistry 357–358 or 359–360 and Physics 207–208), six credits of organic chemistry laboratory, and a third semester of calculus in preparation for the more rigorous physical chemistry sequence (Chemistry 389–390). Students interested in biochemistry should complete a year of introductory chemistry other than Chemistry 103–104 before the start of their sophomore year. Students are also urged to complete introductory biology in their freshman year.

3) *Botany:* A minimum of 13 credits is required from courses chosen with the aid of an adviser to meet the goal of exposing each student to plant structure, function, classification, ecology, and evolution. Three courses, one from each of the three following categories, fulfill the minimum requirements. Students are encouraged to begin the sequence of courses with Bio S 241 (see category b): (a) Bio S 242 and 244 or Bio S 341 and 349, Plant Physiology, Lectures and Laboratory; (b) Bio S 241, Introductory Botany; Bio S 248, Taxonomy of Vascular Plants; Bio S 448, Plant Evolution and the Fossil Record; or Pl Pa 309, Introductory Mycology; and (c) Bio S 345, Plant Anatomy; or Pl Pa 301, Introductory Plant Pathology. Students interested in a broad background in botany are encouraged to take Bio S 346, Algal Physiology; Bio S 444, Plant Cell Biology; Bio S 463 and 465, Plant Ecology, Lectures and Laboratory; and additional courses in (b) and (c).

4) *Cell Biology:* Chemistry 300 or 215–216, Quantitative Chemistry; Bio S 432, Survey of Cell Biology; Bio S 630, Laboratory in Cell Biology (strongly recommended), or Bio S 638, Intermediate Biochemical Methods, or Bio S 430, Basic Biochemical Methods; and at least 5 additional credits chosen from the following courses: Bio S 222, Neurobiology and Behavior II: Introduction to Neurobiology; Bio S 305, Basic Immunology; Bio S 313, Histology: The Biology of the Tissues; Bio S 345, Plant Anatomy; Bio S 435–436, Undergraduate Biochemistry Seminar; Bio S 437 Oncogenes and Cancer Viruses; Bio S 483, Molecular Aspects of Development; Bio S 444, Plant Cell Biology; Bio S 636, Current Topics in Cell Biology; Bio S 639, The Nucleus; An S 419, Animal Cytogenetics.

Students interested in cell biology should complete a year of introductory chemistry other than Chemistry 103–104 before the start of their sophomore year. Students are also urged to complete introductory biology in their freshman year. If graduate work in cell biology is anticipated, students should consider taking a physical chemistry sequence (Chemistry 389–390.1 or 287–288 or 287–390.2).

5) *Ecology and Evolutionary Biology:* Bio S 261, Ecology and the Environment, and 10 credits from the following course lists, including at least one course from each group:

(a) Bio S 241, Introductory Botany; Bio S 274, Functional and Comparative Morphology of Vertebrates; Bio S 373, The Invertebrates: Form, Function, and Evolution; Bio S 460, Physiological Plant Ecology; Bio S 467, Physiological Animal Ecology; Bio S 471, Mammalogy; Bio S 472, Herpetology; Bio S 475, Ornithology; Bio S 476, Biology of Fishes.

(b) Bio S 263, Field Ecology; Bio S 272, Functional Ecology: How Animals Work; Bio S 448, Plant Evolution and the Fossil Record; Bio S 455, Insect Ecology; Bio S 456, Stream Ecology; Bio S 457 and 459, Limnology: Ecology of Lakes, Lectures and Laboratory; Bio S 461, Population and Evolutionary Ecology; Bio S 462, Marine Ecology; Bio S 463 and 465, Plant Ecology and Population Biology, Lectures and Laboratory; Bio S 464, Microevolution and Macroevolution; Bio S 470, Ecological Genetics; Bio S 473, Ecology of Agricultural Systems; Bio S 478, Ecosystem Biology; Bio S 479, Paleobiology; Bio S 481, Population Genetics.

Note: One 400-level, 4-credit course offered at Shoals Marine Laboratory may be applied toward the 10 credits. Students are encouraged to gain experience in some aspect of field biology through course work at a biological field station or work experience.

Note: The Ecology and Evolutionary Biology program of study offers an undergraduate specialization in Marine Biology and Oceanography. A description of this specialization can be found in the section entitled COURSES IN MARINE SCIENCE.

6) *General Biology:* The Program of Study in General Biology requires a minimum of 13 credit hours from courses offered by the Division of Biological Sciences. These credits must include one course from the courses listed for at least three of the eight other programs of study, and must include a course with a laboratory and a minimum of two upper-level (300 and above) courses of two or more credits. Bio S 498 may not be used as one of the upper-level courses. Bio S 499 may count as one of the upper-level courses, and may count as the laboratory course with approval of the adviser.

7) *Genetics and Development:* A minimum of 13 credits, usually chosen from the following courses: Bio S 385, Developmental Biology; Bio S 389, Embryology; Bio S 433, Molecular Biology; Bio S 470, Ecological Genetics; Bio S 480, Seminar in Developmental Biology; Bio S 481, Population Genetics; Bio S 482, Human Genetics and Society; Bio S 483, Molecular Aspects of Development; Bio S 484, Molecular Evolution; Bio S 485 and 487, Microbial Genetics; Bio S 633 Biosynthesis of Macromolecules; Bio S 639, The Nucleus; Bio S 641, Laboratory in Plant Molecular Biology; Bio S 644, Plant Growth and Development; Bio S 652, Plant Molecular Biology II; Bio S 653, Plant Molecular Genetics; Bio S 684, Advanced Topics in Population Genetics; Bio S 686, Mammalian Development; Bio S 687, Developmental Genetics; Bio S 688, Yeast Genetics; Bio S 695, Bacterial Genetics; Pl Br 606, Advanced Plant Genetics.

Up to 3 credits for this program of study may be chosen from other biological sciences courses with approval of the faculty adviser.

8) *Microbiology:* Bio S 290, General Microbiology, Lectures; Bio S 291, General Microbiology, Laboratory; Bio S 300, Seminar in Microbiology; Bio S 391, Advanced Microbiology Laboratory; and at least 5 credits from the following course lists, including at least one course from each group: (a) Bio S 485, Microbial Genetics; or Bio S 416, Microbial Physiology; and (b) Bio S 415, Bacterial Diversity; or Bio S 451, Structure and Function of Bacterial Cells.

9) *Neurobiology and Behavior:* The two-semester introductory course sequence, Neurobiology and Behavior I and II (Bio S 221 and 222) with discussion section (4 credits per term), and 7 additional credits, among which must be a course from the neurobiology and behavior offerings. Bio S 420, 498, 499, and 720 may not be used as this neurobiology and behavior course. However, these readings and independent research courses may form part of the additional credits (beyond those provided by the advanced neurobiology and behavior course) required to complete the Program of Study in Neurobiology and Behavior.

Note: Students who declare the Program of Study in Neurobiology and Behavior after taking Bio S 221 or 222 for only 3 credits must complete additional course work in neurobiology and behavior. These students should consult the chair of the Section of Neurobiology and Behavior (W119 Seeley G. Mudd Hall) to determine what course(s) to use to make up the deficiency.

10) *Independent Option:* A special program for students interested in nutrition is available under this option. In addition, students who want to undertake a course of study not covered by the nine existing programs of study or the special program may petition the Division of Biological Sciences Curriculum Committee. Information on independent options and Curriculum Committee petition forms are available in the Office for Academic Affairs, 200 Stimson Hall.

Independent Research and Honors Program

Individual research projects under the direction of a faculty member are encouraged as an aspect of study within a program of study. Applicants for research projects are accepted by the individual faculty members, who take into account students' previous academic accomplishments, interests, and goals and the availability of space and equipment suitable for the proposed project. Students accepted for independent research enroll for credit in Biological Sciences 499 (Undergraduate Research in Biology) with the written permission of the faculty supervisor. Students register for this course in 200 Stimson Hall. Any faculty member in the Division of Biological Sciences may act as a supervisor. Faculty supervisors outside the division are acceptable only if a faculty member of the division agrees to take full responsibility for the quality of the work. Information on faculty research activities and undergraduate research opportunities is available in the Behrman Biology Center, 216 Stimson Hall.

Research credits may not be used in completion of the following program of study areas: animal physiology and anatomy; biochemistry; botany; cell biology; ecology and evolutionary biology; genetics and development; and microbiology. No more than 4 credits of research may be used in completion of the Program of Study in Neurobiology and Behavior.

The honors program in biological sciences is designed to offer advanced training in laboratory or field research through the performance of an original research project under the direct guidance of a member of the Cornell faculty. Applications for the honors program are available in the Office for Academic Affairs, 200 Stimson Hall, and must be submitted to the Honors Program Committee by the deadline announced early in the senior year. Application forms for the honors program are separate from the enrollment forms for Biological Sciences 499 (Undergraduate Research in Biology). To qualify for the program, students must have been accepted into the biological sciences major, have completed at least 30 credits at Cornell, and have an overall Cornell cumulative grade-point average of at least 3.00. In addition, students must have at least a 3.00 Cornell cumulative grade-point average in all biology, chemistry, mathematics, and physics courses. (Grades earned in courses in other departments that are used to fulfill major requirements are included in this computation.) In addition, candidates must have a faculty member to supervise their research. Any faculty member in the Division of Biological Sciences may act as a supervisor. Students may also work with faculty supervisors outside the division. Students who select supervisors outside the division must arrange for a faculty member of the division to serve as cosigner of the research. The division cosigner must agree to meet with the student on a regular basis, to report to the Honors Program Committee on the progress of the work approximately two months before the thesis is due, and to serve as a reviewer of the thesis. An honors candidate usually enrolls for credit in Biological Sciences 499 (Undergraduate Research in Biology) under the direction of the faculty member acting as honors supervisor, although it is not necessary to do so. Students choosing to earn credit for

honors research must enroll in Biological Sciences 499 (Undergraduate Research in Biology) separate from the honors program. Requirements of the honors program include participation in honors research seminars during two semesters, submission of an acceptable honors thesis, completion of all major requirements, and maintenance of the 3.00 Cornell cumulative grade-point average through graduation. Recommendation to the faculty that a candidate graduate with honors is the responsibility of the Honors Program Committee.

Students interested in the honors program should consult their faculty advisers early during their junior year. Students are strongly encouraged to begin their research projects in their junior year, although they are not formally admitted to the honors program until the beginning of their senior year. Students who are considering study abroad during their junior year should consult with a member of the Honors Committee during their sophomore year to plan a reasonable schedule for honors research. The Honors Program requires that student participants attend honors seminars in which they give oral presentations during the first and second semesters of their senior year. Therefore, students who are considering studying away from campus during the senior year should consult with a member of the Honors Committee no later than the beginning of the first semester of their junior year. Details pertaining to thesis due dates, seminars, and other requirements may be obtained from the chair of the Honors Program Committee or from the Office for Academic Affairs, 200 Stimson Hall. Information on faculty research activities is available in the Behrman Biology Center, 216 Stimson Hall. Deviation from any of the requirements of the Honors Program requires a petition in the form of a letter to the Honors Program Committee, c/o 200 Stimson Hall.

CURRICULUM COMMITTEE

Many decisions pertaining to the curriculum, to division-wide requirements, and to the programs of study are made by the Curriculum Committee of the division. The committee consists of faculty and elected student members and welcomes advice and suggestions from all interested persons.

ADVISING

Students in need of academic advice are encouraged to consult their advisers, come to the Behrman Biology Center (216 Stimson Hall), or contact the associate director for academic affairs (200 Stimson Hall).

Students interested in marine biology should visit the Cornell Marine Programs Office, G14 Stimson Hall.

Students interested in the multidisciplinary program Biology and Society should see "Special Programs and Interdisciplinary Studies," in the College of Arts and Sciences section of this catalog.

INDEX OF COURSES

The middle digits of biological sciences course numbers are used to denote courses in specific areas: 0, general or microbiology; 1, animal physiology and anatomy or microbiology; 2, neurobiology and behavior; 3, biochemistry or cell biology; 4, botany; 6 and 7, ecology, systematics, and evolution; 8, genetics and development; 9, microbiology; or neurobiology and behavior. The middle digit 5 is used when all other course numbers in a particular area have already been assigned.

Note: Biological sciences courses count as agriculture and life sciences credits for students in the College of Agriculture and Life Sciences and as arts and sciences credits for students in the College of Arts and Sciences.

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201	337
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205	338
206	338
207	338
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209	338
212 (new)	340
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222	354
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243	344
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282	351
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300	352
301	338
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308	352
309	357
311	340
312 (new)	340
313	340
316	340
317	352
319	340
322	354
324	354
326	354
327 (new)	357
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349	345
359	345
363	357
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367	358
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GENERAL COURSES

BIO S 101–102 Biological Sciences, Lectures

101, fall; 102, spring. 2 credits each term. Prerequisite: concurrent enrollment in Biological Sciences 103 (fall) or 104 (spring). Passing grade (D) or better) in 101 is prerequisite to 102 unless written permission is obtained from instructor. S-U grades optional, with permission of instructor. May not be taken for credit after Biological Sciences 105–106 or 109–110.

Lecs, M W F 9:05 or 10:10. 2 lecs each week; to accommodate these, students must reserve all 3 days. Evening prelims: fall, Sept. 24 and Nov. 10; spring, Feb. 25 and Apr. 8. A. W. Blackler.

Designed both for students who intend to specialize in biological sciences and for those specializing in other subjects, such as the social sciences or humanities, who want to obtain a thorough knowledge of biology as part of their general education. Plant and animal materials are considered together rather than in separate units. The fall semester covers the chemical and cellular basis of life, energy transformations, and cell and tissue biology. The spring semester covers genetics, development, evolution, ecology, and the origin of life. Each topic is considered in the light of modern evolutionary theory.

BIO S 103–104 Biological Sciences, Laboratory

103, fall; 104, spring. 2 credits each term. Prerequisite: concurrent enrollment in Biological Sciences 101 (fall) or 102 (spring). 103 is prerequisite to 104 unless written permission is obtained from instructor. S-U grades optional, with permission of instructor. No admittance after second week of classes.

Lab, M T W or R 1:25–4:25, M or W 7:30–10:30 p.m. or T R or S 8–11. One 3-hour lab each week and a weekly lec for discs, special lecs, etc. J. C. Glase, P. R. Ecklund, and staff.

Biological Sciences 103–104 is designed to give students laboratory experience with major biological phenomena in order to support an understanding of the important concepts, principles, and theories of modern biology. A second objective of the laboratory course is to help students gain expertise in the methods used by biologists to construct new knowledge. Students are exposed to basic concepts, research methods, including laboratory and data transformation techniques, and instrumentation in the major areas of biology. First-semester topics include biochemistry, physiology, invertebrate diversity, and behavior. In the second semester, laboratory experience is provided in the areas of genetics, biotechnology, immunology, plant biology, population genetics and growth, and ecology. During the first semester, dissection of a doubly-pithed frog is included. Pithing is done by the instructor.

BIO S 105–106 Introductory Biology

105, fall; 106, spring. 4 credits each term (or 2 credits, with permission of instructor). Enrollment limited to 200 students. Prerequisite: 105 is prerequisite to 106, unless written permission is obtained from instructor. S-U grades optional, with written permission of instructor. May not be taken for credit after Biological Sciences 101–104 or 109–110. No admittance after first week of classes.

Lec, T 9:05 (1st lec of fall term, R 8/27 9:05); additional study and lab hours to be arranged. Staff.

Designed primarily for biology majors, preprofessionals, and other students who desire a challenging, broad introduction to fundamental concepts of biology. Physiology, anatomy (accompanied by preserved vertebrate dissection), and biochemistry are strongly emphasized in the fall semester. Subjects of study in the spring semester are genetics, development, ecology, evolution, behavior, and the diversity of organisms. The course uses an autotutorial format and offers considerable flexibility in scheduling. Completion of the course requires mastery of a group of core units. Testing on these units is primarily by oral examination. Four formal laboratory sessions are offered each semester. Written reports on experimental work are required in the fall; extensive dissections (both invertebrate and vertebrate) with practical exams constitute spring laboratories. The core units include additional laboratory work. Performance on the core units, the laboratories, and the final examination determine the final grade. Students who object to dissecting live invertebrates may want to take another biology course.

BIO S 107–108 General Biology

Summer (8-week session; 107, weeks 1–4; 108, weeks 5–8). 4 credits each. Prerequisite: Biological Sciences 101–103, 105, or 107 is a prerequisite for 108. Fee, $25 for weeks 1–4; $15 for weeks 5–8.

Lecs, M-R 9–12; labs, M T R 1:30–4:30, F 9–12. Staff.

Designed for students who plan further study in biology and for students who want a broad course in biology as part of their general education. Biological Sciences 107 covers biological metabolism, first at the molecular level and then progressively to the organ system level. The laboratory work involves an introduction to some major techniques, vertebrate dissection, and a survey of plant organization. Biological Sciences 108 seeks to integrate the topics of genetics, developmental biology, population biology, and ecology in a general consideration of biological evolution. The laboratory work is a continuation of the material covered in Biological Sciences 107 and involves more techniques, a survey of animal organization, and the design and performance of a field study. Biological Sciences 107–108 fulfills the introductory biology requirement for majors and forms a suitable introductory biology course sequence for students intending to go to medical school.

BIO S 109–110 Biological Principles

109, fall; 110, spring. 3 credits each term. Limited to 600 students. A passing grade in 109 or 101–103 or 105 is prerequisite to 110 unless written permission is obtained from the instructor and the student has at least 3 credits of college biology. Since 109–110 together constitute an integrated survey, 109 cannot be used to satisfy the College of Arts and Sciences or College of Agriculture and Life Sciences distribution requirement unless it is followed by 110 or an exemption is obtained from the instructor. Letter grades only. May not be taken for credit after Biological Sciences 101–104 or 105–106. This course sequence may be used to fulfill the distribution requirement in the Colleges of Agriculture and Life Sciences, Arts and Sciences, and Human Ecology but may *not* be used as an introductory course for the major in biological sciences. *Note that this course may not always satisfy the prerequisite for second- and third-level courses in biology.*

Lecs, M W F 9:05 or 10:10; lab, M T W R or F 2–4:25 or T 10:10–12:35. Students do not choose lab sections during course enrollment; lab assignments are made during first day of classes. Each student must attend lab on alternate weeks. Evening prelims: fall, Sept. 24 and Nov. 10; spring, Feb. 25 and Apr. 8. C. H. McFadden.

Students who do not plan to major in biology may take this broad introductory course in modern biology. It is not a course in social biology but addresses itself to biological principles with academic rigor. The content is designed to appeal to anyone who seeks a comprehensive knowledge of biology as part of a general education. Laboratory sections enable small groups of students to meet with the course staff and are used for problem-solving experiments, demonstrations, and discussions. No live dissections are involved; there are dissections of vertebrate and invertebrate material.

BIO S 152 Special Topics in Biology

Spring. 1 credit. Limited to 30 students. Prerequisites: superior performance in Biological Sciences 109 or equivalent and concurrent enrollment in Biological Sciences 102, 106, or 110, or written permission of instructor. S-U grades only. *This course may not be used in fulfillment of college distribution requirements.*

Lec, T 3:35; occasional field trips to be arranged. R. Turgeon and guest lecturers.

A lecture course designed to complement introductory biology by providing an opportunity for deeper exploration of selected topics of interest. Class involvement and discussion are encouraged.

BIO S 200 Special Studies in Biology

Fall, spring, or summer. 1–3 credits. Prerequisites: transfer- or special-student status and written permission of instructor and of the associate director of the Division of Biological Sciences. Students must register using a special form available in Stimson 200. S-U grades optional, with permission of instructor.

Hours to be arranged. Staff.

A registration device for students who want to take only a portion of a regular biological sciences course—for example, only the lectures or only the laboratory in a course that includes both. Only students who have already had training equivalent to the portion of the regular course that is to be omitted may register in this manner. This course may not be substituted for 100-level courses and may not be used in fulfillment of college distribution requirements.

BIO S 201 Biotechnology: The "New" Biology (also Biology and Society 201)

Spring. 3 credits. This course is for students *not* majoring in biological sciences. Students who have taken or are currently enrolled in Bio. Sci. 281 or Bio. Sci. 330 or 331 may not enroll. S-U grades optional.

Lecs, T R 2:30; disc, T or R 3:35 (students must reserve both days for special sessions). J. M. Fessenden MacDonald, J. M. Calvo, S. Howell, M. L. Noden, J. E. Fortune.

Designed for nonmajors, a general introduction to the application of modern molecular

biology and cell culture techniques to the manipulation and genetic engineering of animals, plants, and microorganisms. Information on recombinant DNA technology, monoclonal antibodies, plant and/or animal cell culture, and embryo manipulation methods is presented. Topics include environment, agriculture, and food; and economic, social-policy, regulatory, ethical, and legal issues that surround biotechnology. The course is taught in four modules and the topics vary from year to year. Topics for 1993 are genetic screening, crop plant biotechnology, immunology and AIDS, and human reproductive biotechnology. Recommended for those students who want to understand some new research discoveries, their applications, and social, legal, ethical, and policy issues stemming from them.

BIO S 202 History of Biology (also Biology and Society 288, History 288, and Society and Technology Studies 288)

Spring. 3 credits. Prerequisite: one year of introductory biology. S-U grades optional.

Lecs, T R 10:10–11:25. W. B. Provine.

An examination of the history of biology, emphasizing the interaction of biology and culture. Original writings of biologists constitute the bulk of reading assignments. Covers the period from classical antiquity to the present, but primary emphasis is on twentieth-century biology.

BIO S 205 Ethics and Health Care (also Biology and Society 205 and Philosophy 245)

Fall or summer (6-week session). 4 credits. Limited to 80 students (25 under Biological Sciences 205, 25 under Biology and Society 205, and 30 under Philosophy 245). Registered students not attending during the first week will be dropped from the course. Open to sophomores, juniors, and seniors; permission of instructor required for graduate students.

Lecs, T R 8:40–9:55; disc, 1 hour each week to be arranged. Staff.

Critical *philosophical* analysis of the conceptual frameworks in which ethical problems associated with health care can be formulated and solutions evaluated. General topics (with sample issues in parentheses) include knowledge in ethics (ethical skepticism, ethical relativism); proper social allocation of resources for, and within, medicine (entitlement to health care, access to scarce medical resources, cost-benefit analysis); the proper account of basic concepts such as illness, death, autonomy, and personhood (abortion, euthanasia, procreative technologies); and the professional-patient relationship (informed consent, confidentiality, medical paternalism).

BIO S 206 Ethics and the Environment (also Biology and Society 206 and Philosophy 246)

Spring. 4 credits. Open to all undergraduates. Permission of instructor required for graduate students.

Lecs, T R 10:10–11.25. Disc, one hour each week to be arranged. Staff.

Critical *philosophical* analysis of the conceptual frameworks in which policies affecting the environment are formulated and judged. An introductory section of the course discusses the nature of ethics and the possibility of knowledge in ethics. The first major substantive component of the course deals with the nature and extent of individual and social obligations to spatially distant people, future generations, nonhuman animals and nonsentient things (e.g., the ecosystem). The second major component of the course deals with the appropriate analysis of the origin of environmental problems and the range of options for their solution. Topics include individual vs. collective goods, cost-benefit analysis, and coordination problems.

BIO S 207 Evolution (also History 287 and Science and Technology Studies 287)

Fall. 3 credits. Intended for students with no background in college biology. May not be taken for credit after Biological Sciences 378. S-U grades optional.

Lecs, T R 10:10; disc, to be arranged. W. B. Provine.

Evolution is the central concept in biology. This course examines evolution in historical and cultural contexts. Aims of the course include understanding the major issues in the history and current status of evolutionary biology and exploring the implications of evolution for culture. Issues range from controversies over mechanisms of evolution in natural populations to the conflict between creationists and evolutionists.

BIO S 208 Drawing the Human Figure

Summer (6-week session). 3 credits.

Labs, M T W 3–5:15. K. Kucharski.

Human anatomy. Emphasis on learning correct anatomical information relating to the skeletal and muscular systems as approached through observation and drawing practices.

BIO S 209 Introduction to Natural Science Illustration

Summer (6-week session). 2 credits. Limited to 12 students. Prerequisite: free-hand drawing or permission of instructor. S-U grades optional.

Lecs and labs, T R 6:30–9:30 p.m. B. S. King.

An introduction to the art of natural science illustration for publication, and to the techniques of various media including pencil, pen and ink, watercolor, colored pencil, scratchboard, and carbon dust. Potentials and limitations of line and half-tone reproduction, copyright, and portfolio presentation are discussed.

BIO S 301 Biology and Society: The Social Construction of Life (also Biology and Society 301 and Science and Technology Studies 401)

Fall. 4 credits. Prerequisite: one year of introductory biology.

Sems and discs, M W 2:30–4:25. P. J. Taylor.

Controversial issues, past and present, in the life sciences and tools for analysis of the social, historical, and conceptual underpinnings of these issues. Topics include evolution and natural selection, heredity and genetic determinism, biotechnology and reproductive interventions, and ecology and environmental change. Analytic themes include bias, metaphor, historical semantics, styles of explanation, determinism, causality, interest, social construction, and mapping. Through discussions and writing exercises, students develop analytic skills and explore their own responses to current issues.

BIO S 305 Basic Immunology, Lectures (also Veterinary Medicine, Immunology, and Parasitology 315)

Fall. 3 credits. Strongly recommended: basic courses in microbiology, biochemistry, and genetics.

Lecs, T R 8:30–9:55. Evening prelims: Sept. 24, Oct. 15, and Nov. 17. A. J. Winter.

A survey of immunology, with emphasis on the biological functions of the immune response.

BIO S 400 Undergraduate Seminar in Biology

Fall or spring. Variable credit (1–3 credits assigned for individual seminar offerings). May be repeated for credit. S-U grades optional.

Sem to be arranged. Staff.

From time to time specialized seminars on topics of interest to undergraduates are offered by visiting faculty or faculty from the Sections of Ecology and Systematics, Genetics and Development, or Plant Biology. Topics and instructors are listed in the division's catalog supplement issued at the beginning of the semester. For students interested in Biochemistry, Physiology, or Neurobiology, please see descriptions under appropriate section.

BIO S 401 Introduction to Scanning Electron Microscopy

Fall or spring, weeks 1–8. 1 credit. Limited to 8 students (fall), 12 students (spring). Prerequisite: permission of instructor. S-U grades optional.

Lec, M 10:10; lab, T R or F 9:05–12:15 or T W or R 1:25–4:25. Fee may be charged. M. V. Parthasarathy.

An introductory course that includes the principle and use of the scanning electron microscope. Students use biological material to explore and understand some of the fine biological architecture. In addition to preparing the specimens, the students use the scanning electron microscope to study and obtain micrographs of features that interest them.

BIO S 403 Transmission Electron Microscopy for Biologists

Fall. 1, 2, or 3 credits. 3 credits if student takes both sections. Limited to 12 students. Prerequisites: Biological Sciences 313, 345, 443, or written permission of instructor. S-U grades optional.

Lec, T 11:15; labs, M W or T R 1:25–4:25. Two sections: Sec 01, 1 credit, weeks 1–4; sec 02, 2 credits, weeks 5–8. Students may register for one or both sections. Fee may be charged. M. V. Parthasarathy.

Section 01, 1 credit, weeks 1–4, covers the principles and use of the transmission electron microscopy (TEM), with emphasis on proper operation of the instrument and interpretation of images obtained. Negatively stained materials are used for viewing with the transmission electron microscope. Section 02, 2 credits, weeks 5–8, covers the principles and techniques of preparing biological material for transmission electron microscopy. Using animal, plant, and microbe materials this section studies chemical fixtures, cryofixations, ultrathin sectioning, and metal shadowing techniques. Students have two additional weeks to complete laboratory assignments at the end of each section.

BIO S 405 Electron Microscopy in Molecular Biology

Fall, weeks 9–12. 1 credit. Limited to 12 students. Prerequisites: Biological Sciences 403 or proficiency in transmission electron microscopy and written permission of instructor. S-U grades optional.

Lec, T 11:15; labs, M W or T R 1:25–4:25. Fee may be charged. M. V. Parthasarathy, M. Kyle.

An introductory course to electron microscopy (EM) for use as a tool in analyzing molecular structure, interactions, and processes. Methods considered to be most generally applicable to current studies in molecular biology are covered, including visualization of nucleic acids, heteroduplexes, protein molecules and filaments, and EM immunolabelling.

BIO S 407 Advanced Laboratory Techniques

Summer (special programs). 3 credits.

Labs, M–F 9–5. M. Kusch, B. R. Johnson, B. Ruoff.

Intensive laboratory course taught in three one-week modules, stressing techniques in molecular biology, cell biology and physiology, and neurobiology.

Students who take this course must be accepted into the Hughes Scholars Program. The program begins with an intensive three-and-one-half-week laboratory course. After the laboratory course, students spend the next seven weeks doing independent research in a Cornell biology laboratory. Students receive stipends of $2,400. Students are expected to continue their research projects by enrolling in Biological Sciences 499 and attending a one-credit fall and spring seminar course (Biological Sciences 400) during their senior year. Information about the program and applications are available from the Behrman Biology Center, 216 Stimson Hall, or from Meredith Kusch (255-9405). Application deadline is in mid-February each year.

BIO S 450 Optical Methods of Biologists

Spring. 3 credits. Limited to 12 students. Prerequisite: one year of introductory biology and permission of instructor.

Lecs, T R 1:25; lab, R 2:15–4:30. R. O. Wayne.

Theoretical and practical aspects of light microscopy, including brightfield, darkfield, phase-contrast, polarization, Hoffman-modulation contrast, interference, differential-interference-contrast, and fluorescence microscopy, as well as video- and computer-based digital image enhancement, are studied. Students learn both qualitative and quantitative techniques to probe noninvasively the structure and function of living plant cells.

BIO S 469 Food, Agriculture, and Society (also Biology and Society 469 and Science and Technology Studies 469)

Spring. 3 credits. Prerequisite: an introductory ecology course or permission of instructor. S-U grades optional. Possible fee for course reading materials.

Lecs, T R 1:25–2:40. A. G. Power.

A multidisciplinary course dealing with the social and environmental impact of food production in the United States and in developing countries. Agroecosystems of various kinds are analyzed from biological, economic, and social perspectives. The impacts of traditional, conventional, and alternative agricultural technologies are critically examined in the context of developed and developing economies. Specific topics include pest management, soil conservation, farm labor, land reform, biotechnology, and international food policy.

BIO S 498 Teaching Experience

Fall or spring. 1–4 credits. Enrollment limited. Prerequisites: previous enrollment in the course to be taught or equivalent, and written permission of instructor. S-U grades optional, with permission of instructor. *Students in the College of Arts and Sciences may not count credits from this course toward the 120 credits required for graduation.*

Hours to be arranged. Staff.

Designed to give qualified undergraduate students teaching experience through actual involvement in planning and assisting in biology courses. This experience may include supervised participation in a discussion group, assisting in a biology laboratory, assisting in field biology, or tutoring. Biological sciences courses currently offering such experience include Biological Sciences 105–106, 231, 274, 291, 292, 311, 319, 330, 430, and 475.

BIO S 499 Undergraduate Research in Biology

Fall or spring. Variable credit. *Students in the College of Arts and Sciences may not register for more than 6 credits per term with one supervisor or 8 credits per term with more than one supervisor.* Prerequisite: written permission of staff member who supervises the work and assigns the grade. Students must register in the Office for Academic Affairs in 200 Stimson. Each student must submit an independent study statement describing the proposed research project during course registration. (Special forms for this purpose are available in the college offices and in 200 Stimson Hall.) S-U grades optional. Any faculty member in the Division of Biological Sciences may act as a supervisor. Faculty supervisors outside the division are acceptable only if a faculty member of the division agrees to serve as cosigner, taking full responsibility for the quality of the work.

Hours to be arranged. Staff.

Practice in planning, conducting, and reporting independent laboratory and library research programs. Research credits may *not* be used in completion of the following programs of study: animal physiology and anatomy; biochemistry; botany; cell biology; ecology and evolutionary biology; genetics and development; and microbiology. No more than 4 credits of research may be used in completion of the program of study in neurobiology and behavior.

BIO S 601 Evolution, Ecology, and Behavior

Summer (special programs). 3 credits.

Lecs, M–F 9–5; labs, M–F 1:30–4:30. R. R. Hoy, W. Provine, J. Yavitt, and staff.

Lecture and laboratory course designed specifically for high-school biology teachers. The lecture covers some aspects of evolution, behavior, and ecology. Includes fieldwork in ecology that is designed to enable participants to lead their own classes in field exercises near their own high schools.

Cornell has received a three-year grant from the National Science Foundation Teacher Enhancement Program to upgrade the information and skills of high-school biology teachers. Twenty teachers from a hundred-mile radius of Ithaca are chosen to participate each summer in a three-week intensive program at Cornell. A major part of the program is a lecture and laboratory course. In addition, there are field trips to various Cornell research facilities, guest lectures by Cornell faculty on their research interests, as well as discussions with faculty involved in teaching introductory biology. Teachers also perform laboratory exercises designed for high school biology classes. There is an important component providing teachers with instruction and practice in the use of computers directed toward enhancing teaching. Each selected participant will be provided with an Apple Macintosh computer on long-term loan.

BIO S 602 Molecular Biology for Teachers

Summer (special programs). 3 credits.

Lecs, M–F 9–5. R. Calvo, M. L. Cordts, M. Colvard.

Lecture and laboratory course in molecular biology designed specifically for high-school biology teachers. The lecture material covers the structure and biosynthesis of macromolecules, recombinant DNA technology, the unexpected complexity of eukaryotic genes, and the application of recombinant DNA technology to medicine and agriculture. The laboratories provide experience with techniques used in modern molecular biology. Registration limited to teachers selected to participate in the Cornell Institute for Biology Teachers.

Cornell has received a five-year grant from the Howard Hughes Medical Institute to upgrade the information and skills of high-school biology teachers. Twenty teachers from a hundred-mile radius of Ithaca are chosen to participate each summer in a three-week intensive program at Cornell. A major part of the program is a lecture and laboratory course in molecular biology. Also included are field trips to various Cornell research facilities, guest lectures by Cornell faculty on their research interests, as well as discussions with university faculty involved in teaching introductory biology. Teachers also perform laboratory exercises designed for high-school biology classes. To enable teachers to implement new laboratory exercises, the grant provides each teacher with up to $2,000 worth of equipment and supplies to take home to their biology classes plus an Apple MacIntosh computer on long-term loan. Participating teachers get 3 credits, board, and a stipend. Applicants should not apply directly to the Summer Session Office. More information on the program and the application process is available from Rita Calvo or Stephanie Henkel, Cornell/Hughes Program, 169 Biotechnology Building, (607) 254-4831.

BIO S 606 Freeze-Fracture Technique

Spring, weeks 9–14. 1 credit. Primarily for graduate students. Limited to 8 students. Prerequisites: Biological Sciences 403 or equivalent, and permission of instructor. S-U grades only.

Lec, M 10:10; disc to be arranged; labs, M W 1:25–4:25. Fee may be charged. M. V. Parthasarathy.

Principles of freeze-fracturing and freeze-substitution technique, freezing artifacts, and interpretation of images.

BIO S 608 Advanced Electron Microscopy for Biologists

Spring, weeks 10–14. 1 credit. Primarily for graduate students. Limited to 6 students. Prerequisite: Biological Sciences 403 or equivalent. S-U grades only.

Hours to be arranged. Fee may be charged. M. V. Parthasarathy.

Project in biological ultrastructure.

[BIO S 702 X-Ray Elemental Analysis in Biology
Spring, weeks 7–14. 1 credit. Limited to 6 students. Prerequisites: Biological Sciences 403 or equivalent, and permission of instructor. S-U grades only. Offered alternate years. Not offered 1992–93.
Lec and lab to be arranged. Fee may be charged. M. V. Parthasarathy, C. Daugherty.
Principles of X-ray elemental analysis are discussed, with special reference to the energy-dispersive system. Emphasis is on qualitative elemental analysis of biological specimens and preparation of material for such analysis, including freeze-substitution technique. A brief introduction to quantitative elemental analysis is also given.]

[BIO S 705 Advanced Immunology Lectures (also Veterinary Microbiology, Immunology, and Parasitology 705)
Spring. 3 credits. Prerequisite: Biological Sciences 305 or permission of instructor. Offered alternate years. Not offered 1992–93.
Lecs, M W F 9:05. Coordinator: A. J. Winter.
Coverage at an advanced level of molecular and cellular immunology.]

BIO S 706 Immunology of Infectious Diseases and Tumors (also Veterinary Microbiology, Immunology, and Parasitology 719)
Spring. 2 credits. Prerequisite: Biological Sciences 305 or permission of instructor.
Lec to be arranged. Coordinator: A. J. Winter.
Coverage at an advanced level of the immunology of diseases caused by selected bacterial, viral, protozoan, and helminthic parasites, and tumor immunology.

Related Courses in Other Departments

Introduction to Oceanography (Biological Sciences 154)

Medicine and Civilization (Biology and Society 322)

Pathogenic Bacteriology and Mycology (Biological Sciences 304 and Veterinary Microbiology, Immunology, and Parasitology 318)

Pathogenic Virology (Biological Sciences 308 and Veterinary Microbiology, Immunology, and Parasitology 317)

ANIMAL PHYSIOLOGY AND ANATOMY

BIO S 212 Human Physiology for Non-Biology Majors
Spring. 3 credits. May not be taken for credit after Biological Sciences 311.
Lecs, M W F 1:25; disc, M W or F 2:15. Two evening prelims to be announced. P. Concannon and staff.
Introduction to the physiology of all major organ systems and the relation of that physiology to human health and disease. Emphasis on understanding of major body functions and control mechanisms regulating each organ system. Students develop a fundamental understanding of how their bodies work that will be the basis of making informed decisions about their own health and medical needs and those of their families. Taught by staff of research physiologists and cooperating physicians.

BIO S 214 Biological Basis of Sex Differences (also Biology and Society 214 and Women's Studies 214)
Fall. 3 credits. Limited to non-biology majors and freshman and sophomore biology majors. Prerequisite: one year of introductory biology. S-U grades optional. Offered alternate years.
Lecs, T R 8:30–9:55; occasional disc to be arranged. J. E. Fortune.
The structural and functional differences between the sexes are examined. Emphasis is placed on mechanisms of mammalian reproduction; where possible, special attention is given to studies of humans. Current evidence on the effects of gender on nonreproductive aspects of life (behavior, mental and physical capabilities) is discussed. The course is intended to provide students with a basic knowledge of reproductive endocrinology and with a basis for objective evaluation of sex differences in relation to contemporary life.

BIO S 311 Introductory Animal Physiology, Lectures (also Veterinary Physiology 346)
Fall. 3 credits. Prerequisites: one year of college biology, chemistry, and mathematics. Recommended: previous or concurrent course in physics. S-U grades optional, with permission of instructor.
Lecs, M W F 11:15. Evening prelims: Sept. 22 and Oct. 29. E. R. Loew and staff.
A general course in animal physiology emphasizing principles of operation, regulation, and integration common to a broad range of living systems from the cellular to the organismal level. Structure/function relationships are stressed along with underlying physico-chemical mechanisms.

BIO S 312 Farm Animal Behavior (also Animal Science 305)
Spring. 2 credits. Prerequisites: introductory course in genetics and animal physiology. S–U grades optional.
Lecs, T R 11:15. E. A. Oltenacu, K. A. Houpt.
The behavior of production species (avian and mammalian) influences the success of any management program. Students study behaviors relating to feeding, reproduction, and social interactions of domestic animals. Management systems for commercial livestock production and their implications for animal welfare and behavior are stressed.

BIO S 313 Histology: The Biology of the Tissues
Fall. 4 credits. Prerequisite: one year of introductory biology. Recommended: background in vertebrate anatomy and organic chemistry or biochemistry.
Lecs, T R 1:25; labs, T R 2:30–5. R. B. Silver.
Provides students with a basis for understanding the microscopic, fine-structural, and functional organization of vertebrates, as well as methods of analytic morphology at the cell and tissue levels. Dynamic interrelations of structure, composition, and function in cells and tissues are emphasized. The course may include work with invertebrate or vertebrate animals.

BIO S 316 Cellular Physiology
Spring. 4 credits. Limited to 100 students, with preference given to students studying in animal physiology and anatomy. Each lab limited to 24 students. Prerequisite: concurrent or previous enrollment in Biological Sciences 330 or 331.
Lecs, M W F 9:05; lab, M T or W 1:25–5 (a R 1:25–5 lab may be added if enrollment exceeds 72 students). Evening prelims: Feb. 25, Mar. 11, Apr. 8, and Apr. 29. A. Quaroni and staff.
Lectures introduce students to the most current information on the ways cells function and regulate themselves and neighboring cells and on what molecules are involved in these regulatory processes. Laboratories provide an introduction to cell and organ culture and to immunological techniques used to study cell structure and function *in vivo* and *in vitro*. Experiments performed in the laboratory are closely related to, and provide practical experience with, subjects covered in the lectures. Vertebrate animals are used in this course. No experimentation is performed on live animals.

BIO S 319 Animal Physiology Experimentation (also Veterinary Physiology 348)
Fall. 3 credits. Designed for upper-level undergraduate and graduate students studying in physiology, and other students interested in biomedically related professions. Graduate students in the Field of Physiology and related fields without equivalent background are strongly encouraged to enroll. Each of 4 afternoon laboratory sections limited to 20 students. Prerequisite: concurrent or previous enrollment in Biological Sciences 311 or permission of instructor based on previous meritorious performance in another introductory animal physiology course.
Lab, M T W or R 1:25–5; disc, R or F 12:20. Students do not choose disc sections during course enrollment; disc assignments are made during first day of classes. R. A. Corradino, P. W. Concannon.
A series of student-conducted *in vitro* and *in vivo* experimental exercises designed to illustrate basic physiological processes in animals and to introduce students to animal physiology research techniques, instrumentation, experimental design, and interpretation of results. Techniques include anesthesia, dissection, vivisection under anesthesia, physiographic recording, use of radioisotopes, and computer analysis. Experiments with living tissues and live animals examine properties of blood, muscle, and nerves; cardiovascular, respiratory, and gastrointestinal function and control; and endocrine regulation of mineral metabolism and reproductive tissue activity. Experimental resources include live animals of several vertebrate species, including frogs, birds, rats, and rabbits, which are euthanized in conjunction with the laboratory exercises. Written reports of laboratory activities are required. Grading is based on evaluation of these reports, quizzes, and laboratory performance.

BIO S 458 Mammalian Physiology
Spring. 3 credits. Enrollment limited. Graduate student auditors allowed. Prerequisite: Biological Sciences 311 or equivalent with permission of instructor.
Lecs, M W F 10:10. K. W. Beyenbach and staff.
An in-depth treatment of selected topics in mammalian physiology and human physiol-

ogy. Emphasis is on a conceptual and working knowledge of physiology rather than a factual, memorizing knowledge. Topics selected, in order of presentation, include recurrent themes in physiology; basic functional elements of biological systems; design of multicellular animals; mammalian fluid compartments; homeostasis; cardiovascular, respiratory, gastro-intestinal, and renal physiology; and energy metabolism. The course concludes with a discussion of integrative physiology by considering the multiple, parallel short-term responses of the human body to exercise. Recommended for biological sciences majors, pre-med and pre-vet students, and beginning graduate students in physiology, nutrition, and animal science.

BIO S 615 Nutrition and Physiology of Mineral Elements (also Veterinary Physiology 759 and Nutritional Sciences 659)

Spring. 2 credits. Prerequisites: courses in basic physiology, intermediate biochemistry, and general nutrition.

Lec, T 2:30–4:25. R. Schwartz, R. H. Wasserman, D. R. Van Campen, C. C. McCormick.

Lectures on nutritional aspects and physiological, biochemical, and hormonal relationships of the major macroelements and microelements, with emphasis on recent developments. Discussions of methodologies of mineral research and essentiality, transport, function, homeostasis, interrelationships, and toxicity of various mineral elements.

[BIO S 618 Biological Membranes and Nutrient Transfer (also Veterinary Physiology 752)

Spring. 2 credits. Prerequisites: courses in animal or plant physiology, quantitative and organic chemistry, and physics. Recommended: a course in cellular physiology. S-U grades optional, with permission of instructor. Offered alternate years. Not offered 1992–93.

Lecs, T R 11:15. R. H. Wasserman.

An introduction to elementary biophysical properties of biological membranes; theoretical aspects of permeability and transport; mechanism of transfer of inorganic and organic substances primarily across epithelial membranes; and characteristics and properties of transporting macromolecules and ion channels.]

BIO S 619 Lipids (also Nutritional Sciences 602)

Fall. 2 credits.

Lecs, T R 11:15. A. Bensadoun.

Advanced course on biochemical, metabolic, and nutritional aspects of lipids. Emphasis is placed on critical analysis of current topics in lipid methodology; lipid absorption; lipoprotein secretion, molecular structure, and catabolism; molecular biology; function and regulation of lipoprotein receptors; mechanism of hormonal regulation of lipolysis and fatty acid synthesis; and cholesterol metabolism and atherosclerosis.

[BIO S 658 Molecular Mechanisms of Hormone Action (also Veterinary Physiology 758)

Spring. 2 credits. Prerequisite: permission of instructor. Minimum enrollment of 6 required. Offered alternate years. Not offered 1992–93.

Lecs, T R 10:10. R. A. Corradino.

An advanced course developed from the current literature on endocrine mechanisms. Primarily a lecture course with student discussion.]

BIO S 711–717 Special Topics in Physiology

Fall or spring. 1 or 2 credits for each topic. May be repeated for credit. Enrollment in each topic may be limited. S-U grades optional, with permission of instructor. Lectures, laboratories, discussions, and seminars on specialized topics.

Fall 1992: five topics are offered.

BIO S 711 Stress Physiology As Part of Animal Welfare

Fall. 1 credit. Prerequisite: Biological Sciences 311 or equivalent. Offered alternate years.

Lec, 1 hour each week to be arranged. K. A. Houpt.

Emphasis of the course is on physiological and behavioral assessment of stress in domestic and laboratory animals.

BIO S 712 Membrane and Epithelial Transport

Fall. 1 credit. Offered alternate years.

Lec, 1 hour each week to be arranged. K. W. Beyenbach.

The course begins with a series of lectures on the structure and function of membrane pumps, carriers, and channels. Thereafter, the students read and discuss recent review articles on these subjects. When appropriate, there are laboratory demonstrations to illustrate how some of these transport systems are studied experimentally.

BIO S 713 Cardiac Electrophysiology

Fall. 1 credit. Offered alternate years.

Lec, 1 hour each week to be arranged. R. F. Gilmour.

Survey of cardiac action potentials, passive membrane properties, ion channels, and cardiac arrhythmias. Emphasis on non-linear dynamical aspects of cardiac electrophysiology and cardiac arrhythmias.

BIO S 715 Acid-Base Relations (also Veterinary Physiology 627)

Fall or spring. 2 credits.

Autotutorial. A. Dobson.

BIO S 717 Structure and Function of Joints with Emphasis on Arthritis

Fall. 1 credit. Open to undergraduate and graduate students. Offered alternate years.

Lec, 1 hour each week to be arranged. G. Lust.

Spring 1993: three topics are offered.

BIO S 714 Physiology of Pregnancy

Spring. 2 credits. Offered alternate years.

Lec, 2 hours each week to be arranged. P. W. Nathanielsz.

Seminar course covering aspects of maternal, placental, and fetal function. Emphasis on fetal growth, respiration, neural and endocrine and cardiovascular function, myometrial activity, parturition, and placental function.

BIO S 715 Acid-Base Relations (also Veterinary Physiology 627)

Fall or spring. 2 credits.

Autotutorial. A. Dobson.

BIO S 716 Regulation of Mitosis and the Cell Cycle

Spring. 2 credits. Offered alternate years.

Lec, 2 hours each week to be arranged. R. B. Silver.

The course focuses on regulatory mechanism, Ca^{2+} regulation, metabolic pathways that exhibit cell-cycle-related preiodicities, genetic biochemical and cell physiological studies of the cell cycle, and evidence for intracellular clocks and escapements.

BIO S 719 Graduate Research in Animal Physiology (also Veterinary Physiology 628)

Fall or spring. Variable credit. Prerequisites: written permission of the section chair and of the staff member who supervises the work and assigns the grade. Students must register in Vet Research Tower 725. S-U grades optional.

Hours to be arranged. Staff.

Similar to Biological Sciences 499 but intended for graduate students who are working with faculty members on an individual basis.

[BIO S 757 Current Concepts in Reproductive Biology

Fall. 3 credits. Limited to 20 students. Prerequisites: undergraduate degree in biology and a strong interest in reproductive biology. S-U grades optional. Offered alternate years. Not offered 1992–93.

Lec, 2 hours each week to be arranged; disc, 1 hour each week to be arranged. J. E. Fortune, W. R. Butler, and staff.

A team-taught survey course in reproductive physiology/endocrinology. Lectures by a number of reproductive biologists on various aspects of male reproductive function (endocrine regulation, testis function, spermatogenesis, and sperm physiology/function); female reproductive function (endocrinology, ovarian development and functions, oocyte physiology/function); fertilization and early embryo development; pregnancy; parturition; puberty; and reproductive technology. Student participation in the form of discussions and/or presentations.]

BIO S 811 Advanced Physiological Methods I

Fall. 2 credits. Enrollment limited. Prerequisites: graduate student status or permission of course coordinator. S-U grades only.

Lab to be arranged. Staff.

This is a course primarily for graduate students in physiology and related disciplines. Experiments are carried out in the laboratories of physiology faculty members to acquaint graduate students with the latest techniques/methods in physiological research. Three modules are offered each semester by arrangement with the course coordinator.

BIO S 812 Advanced Physiological Methods II

Spring. 2 credits. Enrollment limited. Prerequisites: graduate student status or permission of course coordinator. S-U grades only.

Lab to be arranged. Staff.

This is a course primarily for graduate students in physiology and related disciplines. Experiments are carried out in the laboratories of physiology faculty members to acquaint graduate students with the latest techniques/methods in physiological research. Three modules are offered each semester by arrangement with the course coordinator.

Related Courses in Other Departments

Adaptations of Marine Organisms (Biological Sciences 413)

Advanced Work in Animal Parasitology (Veterinary Microbiology, Immunology, and Parasitology 737)

Animal Development (Veterinary Anatomy 507)

Animal Reproduction and Development (Animal Science 300)

Developmental Biology (Biological Sciences 385)

Embryology (Biological Sciences 389)

Fundamentals of Endocrinology (Animal Science 427)

Insect Morphology (Entomology 322)

Integration and Coordination of Energy Metabolism (Biological Sciences 637 and Nutritional Sciences 636)

Neuroanatomy (Veterinary Anatomy 504)

Sensory Function (Biological Sciences 492)

Teaching Experience (Biological Sciences 498)

Undergraduate Research in Biology (Biological Sciences 499)

BIOCHEMISTRY, MOLECULAR AND CELL BIOLOGY

BIO S 132 Orientation Lectures in Biochemistry
Spring, weeks 1–3. No credit. Primarily for freshmen, sophomores, and transfer students. S-U grades only (registered students receive an unsatisfactory grade for nonattendance).
Lec, S 10:10–11:00, for first 3 S of semester. Section chair and staff.
Discussions by six professors about their research and promising areas for research in the future.

BIO S 231 General Biochemistry
Fall. 3 credits. Intended for students who have not studied biochemistry previously and who do not expect to pursue it further. Not recommended for students who have taken organic chemistry. Prerequisite: Chemistry 104 or 208 or equivalent. Preregistration with instructor required (309 Wing Hall). S-U grades optional.
Lecs, M W F 12:20. J. M. Griffiths.
A brief introductory section relating organic chemistry to biochemistry is given, followed by the biochemical material in the usual one-semester introductory courses. Topics of general interest are also included.

BIO S 232 Recombinant DNA Technology and Its Applications (also Biology and Society 232)
Spring. 3 credits. S-U grades optional. Limited to freshmen with AP 4 or 5 in biology. Possible fee for course material.
Lecs and disc, M W F 11:15. J. M. Calvo, J. M. Fessenden MacDonald.
An introduction to molecular approaches to biology. Basic concepts underlying recombinant DNA technology together with strategies for cloning genes are discussed. Much of the course deals with applications of recombinant DNA technology to basic research and to biotechnology. Applications to be discussed include screening for genetic diseases, animal and plant improvement, and production of proteins useful in medicine, agriculture, and industry. Scientific, historical, regulatory, social, and ethical issues are presented and discussed. Recommended especially for students desiring a firm background in recombinant DNA technology in preparation for taking genetics and biochemistry.

BIO S 330–331 Principles of Biochemistry
Introductory biochemistry is offered in two formats: individualized instruction (330) and lectures (331). *Individualized instruction is offered to a maximum of approximately 150 students each semester. Lectures given fall semester only.*

BIO S 330 Principles of Biochemistry, Individualized Instruction
Fall or spring. 4 credits (2 credits if taken after Biological Sciences 231). Prerequisite: Chemistry 253 or 358 or equivalent. May not be taken for credit after Biological Sciences 331. S-U grades optional for graduate students only.
Hours to be arranged. Evening prelims: fall, Oct. 22; spring, Mar. 16. M. F. Ferger, G. Albrecht, R. Wu, P. C. Hinkle.
The core material of the course includes protein structure and function, enzymes, basic metabolic pathways, DNA, RNA, protein synthesis, and an introduction to gene cloning. There are no formal lectures; the course has an autotutorial format. The core material is divided into fourteen units of work that are outlined in a study guide written to accompany the textbook. Students prepare the work on their own, with help from the staff of the Study Center if desired, and must pass a written and an oral quiz on each unit. A midterm and final exam are required.

Each student also participates in six class hours of discussions on research papers, and two hours of discussion on review papers during the semester. A small amount of problems or other supplemental work is also assigned.

BIO S 331 Principles of Biochemistry, Lectures
Fall or summer (6–week session). 4 credits (or 2 credits if taken after Biological Sciences 231). Enrollment may be limited to 400 students in fall. Prerequisite: Chemistry 253 or 358 or equivalent. May not be taken for credit after Biological Sciences 330. S-U grades optional for graduate students only.
Lecs, M W F S 10:10. Recitation, 1 hour each week, to be arranged.
G. W. Feigenson, R. Barker, B.-K. Tye.
The course is divided into three parts, each with about eighteen lectures, covering protein structure and function; metabolism and bioenergetics; and nucleic acids, protein synthesis, and gene exploration. Grading is based on quizzes given in the recitation and lecture periods, and the final exam.

BIO S 430 Basic Biochemical Methods
Fall or spring. 4 credits. Enrollment limited. Prerequisites: Biological Sciences 330 or 331, organic chemistry lectures and laboratory, and permission of instructor obtained by preregistering in Wing 312. Concurrent registration in Biological Sciences 330 or 331 may be arranged in the fall term for graduate students.
Lec and disc, F 1:25; labs, M W or T R 12:20–4:25. R. R. Alexander, J. M. Griffiths, and staff.
A laboratory course designed to introduce students to the biochemical techniques commonly used in the study of biological materials. Students work in small groups, and each student may choose some of the experiments after completing a series of required procedures. Various assay methods, chromatography, electrophoresis, and use of the scintillation counter are taught. Protein isolation, purification, and enzyme characterization methods are included. Techniques used in the clinical laboratory are applied to analyses of blood and urine samples, and some nutritional analyses are done for protein and vitamin contents of foods. In the nucleic acids module, students are introduced to recombinant DNA methodology, isolating DNA, and studying the function of transfer RNA. A student may isolate and purify the lipids from a material of his/her choice, perform thin-layer chromatography, and carry out cholesterol and phosphate analyses.

BIO S 432 Survey of Cell Biology
Spring. 3 credits. Prerequisite: Biological Sciences 330 or 331 or equivalent. S-U grades optional for graduate students only.
Lecs, M W F 11:15. W. J. Brown and staff.
A survey of a wide array of topics focusing on the general properties of eucaryotic cells. The topics include methods used for studying cells, the structure and function of the major cellular organelles, and analyses of cellular processes such as mitosis, endocytosis, cell motility, secretion, cell-to-cell communication, gene expression, and oncogenesis. Some of the material is covered in greater depth in Biological Sciences 437, 483, 632, 636, and 639.

BIO S 433 Molecular Biology
Fall. 2 credits. Prerequisites: Biological Sciences 281 and 330 or 331.
Lecs, T R 11:15. T. C. Huffaker.
A comprehensive examination of the molecular biology of prokaryotic and eukaryotic cells. Topics include DNA and chromatin structure; genomic organization; replication, recombination, mutability, and repair of DNA; synthesis and processing of RNA and protein; and regulation of gene expression. The principles of recombinant DNA technology are discussed.

[BIO S 434 Biotechnology: Science, Policy, and Values (also Biology and Society 434)
Spring. 3 credits. Limited to 16 seniors and graduate students. Prerequisites: a course dealing with the science behind biotechnology or Biological Sciences 281 or 330 or 331 or permission of instructor. Fee for course materials. Not offered 1992–93.
Sem, M 2–4:25. J. M. Fessenden MacDonald.
Issues raised by the introduction of new biotechnology products and procedures to health care, food and agriculture, environment, and the legal system are analyzed. The course examines the scientific, political, legal, economic, social, and ethical implications of these issues. Cases studied vary each term. Readings from various disciplines including scientific papers, government reports, and industrial and legal reports provide background for class discussions. A research paper and oral presentations are required. Topics for spring 1994 are DNA diagnostics, DNA screening, gene therapy, and DNA fingerprinting.]

BIO S 435–436 Undergraduate Biochemistry Seminar
435, fall; 436, spring. 1 credit each term. May be repeated for credit. Limited to upperclass students. Prerequisite: Biological Sciences 330 or 331 or written permission of instructor. S-U grades only.
Sem to be arranged. Organizational meeting first W of each semester at 4 p.m. Fall: G. P. Hess; spring: Staff.
Selected papers from the literature on a given topic are evaluated critically during six or seven two-hour meetings.

BIO S 437 Oncogenes and Cancer Viruses
Fall. 3 credits. Prerequisite: Biological Sciences 330 or 331. Recommended: Biological Sciences 281.
Lecs, T R 12:20–1:35. D. I. Shalloway.
A description of the growth properties of animal cells in culture, followed by discussions of the changes in cells that are induced by tumor viruses and oncogenes. Topics include immortalization of cells, the cell cycle, differences between normal and neoplastically transformed cells, macromolecular growth factors, transcription and translation of retrovirus genes, and structure and function of viral and cellular *onc* genes. An understanding of relevant experimental techniques is emphasized.

BIO S 630 Laboratory in Cell Biology
Spring. 4 credits. Enrollment limited. Prerequisites: a course in biochemistry or cell biology, and permission of instructor obtained by *registering in 258 Biotechnology Building with J. Gibson.*
Labs, M W 1:25–4:25 or R 9:05–4:25; disc to be arranged. J. Gibson, B. Tyler.
The course emphasizes approaches to experimental design and theory of experimental techniques as well as providing experience in handling and experimenting with cells of different kinds. Limited numbers of vertebrate animals are used for two experiments where no alternative approach exists.

BIO S 631 Protein Structure and Function
Fall. 3 credits. Prerequisites: introductory biochemistry, physical chemistry, and organic chemistry. S-U grades optional.
Lecs, M W F 9:05. P. A. Karplus.
Lectures on the principles of protein structure and the nature of enzymatic catalysis.

[BIO S 632 Membranes and Bioenergetics
Spring. 2 credits. Prerequisite: Biological Sciences 330 or 331 or equivalent. Offered alternate years. Not offered 1992–93.
Lecs, T R 11:15. P. C. Hinkle.
Structure and dynamics of biological membranes, physical methods, model membranes, ionophores, ion-transport ATPases, mitochondrial and chloroplast electron transfer chains, and examples of transport from plants, animals, and bacteria.]

BIO S 633 Biosynthesis of Macromolecules
Fall. 2 credits. Prerequisite: Biological Sciences 330 or 331. Recommended: Biological Sciences 281.
Lecs, T R 9:05. J. W. Roberts, D. B. Wilson.
Synthesis of DNA, RNA, and proteins, and regulation of gene expression.

BIO S 635 Enzymes, Coenzymes, and Metabolic Regulation (also Nutritional Sciences 635)
Spring. 2 credits. Prerequisites: Biological Sciences 330 or 331 and Chemistry 358 or 360, or permission of instructor. Offered alternate years.
Lecs, T R 9:05. M. N. Kazarinoff.
Lectures on the identification and characterization of regulatory steps in metabolism, considered from both theoretical and practical aspects. The intracellular mechanisms of regulation are emphasized, with specific examples in mammalian metabolism examined in detail.

BIO S 636 Current Topics in Cell Biology
Spring. 2 credits. Prerequisites: Biological Sciences 330 or 331, and 432, or their equivalents.
Lecs, T R 10:10. A. P. Bretscher.
Lectures covering current topics in cell biology, including a detailed discussion of secretion, endocytosis, membrane-bound organelles, membrane recycling, the cytoskeleton, cell motility, junctions, the cell cycle, and related topics. Together with Biological Sciences 632 and 639, this course provides broad coverage of the cell biology subject area.

BIO S 637 Integration and Coordination of Energy Metabolism (also Nutritional Sciences 636)
Fall. 3 credits. Prerequisite: Biological Sciences 330 or 331 or equivalent.
Lecs, M W F 9:05. Evening prelims to be arranged. W. J. Arion.
The elements and dynamics of energy metabolism in humans and higher animals are developed systematically through biochemical characterizations of the metabolic components and structure of major tissues and organs. Emphasis is placed on correlations with physiologic functions. Mechanisms that control energy metabolism within individual tissues and coordinate these processes *in vivo* are analyzed in the contexts of selected physiologic and pathologic stresses.

BIO S 638 Intermediate Biochemical Methods
Fall or spring. 4 credits. Primarily for graduate students minoring in the field of Biochemistry, Molecular and Cell Biology, and undergraduates in the biochemistry program of study. Admission to the course is dependent upon the results of a personal interview with the instructor or the teaching support specialist (x5-8072), which must be held before the first day of classes. *There is no admission to the course without the interview.* Undergraduates are urged to interview during preregistration. May not be taken for credit after Biological Sciences 430.
Lab, T 9:05–4:25 (fall); lab, T or R 9:05–4:25 (spring). V. M. Vogt and staff.
Selected experiments on proteins and DNA. The course emphasizes quantitative aspects as well as experimental design in modern biochemical research.

BIO S 639 The Nucleus
Spring. 2 credits. Prerequisite: Biological Sciences 330 or 331 or equivalent. Recommended: Biological Sciences 281.
Lec, M 8–9:55 p.m. J. T. Lis.
Lectures on topics of eucaryotic gene organization, regulation of gene expression, RNA processing, chromatin structure, the structure and movement of chromosomes, and the architecture of the nucleus. This course and Biological Sciences 632 and 636 provide broad coverage of the cell biology subject area.

BIO S 648 Plant Biochemistry
Spring. 3 credits. Prerequisites: organic chemistry, biochemistry, and a course in plant physiology. Offered alternate years.
Lecs, M W F 9:05. A. T. Jagendorf, J. F. Thompson.
Selected areas of plant biochemistry are reviewed in the context of the plant life cycle and responses to the environment. Topics include metabolism of lipids, carbohydrates, organic acids, and proteins; nitrogen and sulfur assimilation; respiration; photosynthesis; development and replication of chloroplasts; and cell-wall composition and properties. Attention is paid to operation of control mechanisms.

BIO S 732–737 Current Topics in Biochemistry
Fall or spring. 1/2 or 1 credit for each topic. May be repeated for credit. Prerequisite: Biological Sciences 330 or 331 or equivalent. S-U grades only.
Lectures and seminars on specialized topics. Topics for fall and spring to be announced in the division's course supplement published at the beginning of each semester.

BIO S 751 Ethical Issues and Professional Responsibilities (also Toxicology 751 and Science and Technology Studies 751)
Spring. 1 credit. Limited to 12 graduate students per section. S-U grades only. Not offered fall 1992; offered spring 1993 and fall or spring semesters thereafter.
Sem-sec to be arranged. Multiple sections; 12 graduate students per section. Organizational meeting W, 1/27, 3:35.
J. Fessenden MacDonald.
Ethical issues in research and the professional responsibilities of scientists are discussed. Readings from scientific, ethics, and general papers and government reports provide background for discussion. Topics to be discussed include regulations, data manipulation, and misrepresentation; fraud and misconduct; conflicts of interest and commitment; authorship; ownership; peer review; scientific response to external pressure; legal liabilities; and professional codes of ethics.

[BIO S 755 Biotechnology Transfer (also Science and Technology Studies 755)
Fall or spring. 1 credit. S-U grades only. Not offered 1992–93.
Sem to be arranged. D. B. Wilson.
Lectures and discussions on technology transfer and research in non-academic settings by speakers from industry, government, and academe. Focus is on opportunities for technology transfer and research in areas of biotechnology (agricultural, food, environment, pharmaceutical), biochemistry, bioengineering, and chemistry.]

BIO S 830 Biochemistry Seminar
Fall or spring. No credit.
Sem, F 4:30. Staff.
Lectures on current research in biochemistry, presented by distinguished visitors and staff members.

BIO S 831 Advanced Biochemical Methods I
Fall. 6 credits. Limited to graduate students majoring in biochemistry. S-U grades optional.
Labs and discs, 12 hours each week to be arranged. Organizational meeting first R of semester, 10:10. B. Tyler and staff.
To learn the basic concepts and approaches to biochemical research, students participate in discussions and perform experiments on proteins, enzymes, DNA, and cell biology experiments of their choice. First half of the fall term is an intensive, structured course. Letter grades are assigned for this laboratory portion of the course. Second half of the fall term is devoted to a rotation project in different labs selected by the students. S-U grades only are assigned for the rotation portion of the course.

BIO S 832 Advanced Biochemical Methods II
Spring. 6 credits. Limited to graduate students majoring in biochemistry. S-U grades only.
Lab to be arranged. Staff (coordinator: J. M. Calvo, graduate field representative).
Research in the laboratories of two or three different professors chosen by the student. Arrangements are made jointly between the graduate field representative and the research adviser.

BIO S 833 Research Seminar in Biochemistry
Fall and spring. 1 credit each term. (Students must register for 2 credits each term, since an "R" grade is given at the end of the fall term.) May be repeated for credit. Required of, and limited to, second-, third-, and fourth-year graduate students majoring in biochemistry. S-U grades only.
Sem, T 5–6:30 p.m. T. C. Huffaker, W. J. Brown, J. T. Lis.
Each student presents one seminar per year on his or her thesis research and then meets with instructors and thesis committee members for evaluation.

BIO S 835 Methods and Logic in Biochemistry, Molecular and Cell Biology
Fall and spring. 1 credit each term. (Students must register for 2 credits each term, since an "R" grade is given at the end of the fall term.) Limited to first-year graduate students majoring in the Field of Biochemistry, Molecular and Cell Biology. S-U grades only.
Sem and disc to be arranged.
T. C. Huffaker, P. A. Karplus.
A seminar course with critical discussion by students of original research papers. A variety of topics in biochemistry, molecular and cell biology are covered.

Related Courses in Other Departments

Lipids (Biological Sciences 619 and Nutritional Sciences 602)

Molecular Aspects of Development (Biological Sciences 483)

Molecular Mechanisms of Hormone Action (Biological Sciences 658 and Veterinary Medicine 758)

Teaching Experience (Biological Sciences 498)

Undergraduate Research in Biology (Biological Sciences 499)

BOTANY

BIO S 241 Introductory Botany
Fall. 3 credits. Prerequisite: one year of introductory biology or permission of instructor.
Lecs, T R 9:05; lab, M T W R or F 1:25–4:25, or M or W 7:30–10:30 p.m.
D. J. Paolillo, W. L. Crepet.
Introductory botany for those who plan to specialize in or use some aspect of the plant sciences. Emphasizes structure, reproduction, and classification of angiosperms and the history of life on earth. Laboratory emphasizes development of skills in handling plant materials, including identification. First and second weeks of laboratory are field trips, starting with the first day of classes. *Those who register for an evening laboratory are still required to attend the afternoon field trips.*

BIO S 242 Plant Physiology, Lectures
Spring. 3 credits. Primarily for undergraduates in agricultural sciences, but also for any Biological Sciences students wanting to know about plant function. Suitable as a second-level course for nonmajors to satisfy the biology distribution requirement. Prerequisites: one year of introductory biology and introductory chemistry. Concurrent enrollment in Biological Sciences 244 required of undergraduates except those majoring in the social sciences or humanities, for whom it is recommended. May not be taken for credit after Biological Sciences 341 except by written permission of instructor.
Lecs, M W F 10:10. P. J. Davies.
How plants function and grow. Examples deal with crop plants or higher plants where possible, though not exclusively. Topics include cell structure and function; plant metabolism, including photosynthesis; light relations in crops; plant-water relations; water uptake, transport, and transpiration; irrigation of crops; sugar transport; mineral nutrition; growth and development—hormones, flowering, fruiting, dormancy, and abscission; stress; tissue culture; and genetic engineering.

BIO S 243 Taxonomy of Cultivated Plants
Fall. 4 credits. Prerequisite: one year of introductory biology or written permission of instructor. May not be taken for credit after Biological Sciences 248.
Lecs, M W 10:10; labs, M W 2–4:25.
M. A. Luckow.
A study of ferns and seed plants, their relationships, and their classification into families and genera, emphasizing cultivated plants. Particular emphasis is placed on gaining proficiency in identifying and distinguishing families and in preparing and using analytic keys. Attention is also given to the economic importance of taxa, to the basic taxonomic literature, and to the elements of nomenclature.

BIO S 244 Plant Physiology, Laboratory
Spring. 2 credits. Prerequisite: concurrent enrollment in Biological Sciences 242. May not be taken for credit after Biological Sciences 349.
Disc and lab, M T W or R 12:20–4:25.
C. Reiss.
Experiments exemplify concepts covered in Biological Sciences 242 and offer experience in a variety of biological and biochemical techniques, including use of small amounts of radioisotopes.

BIO S 245 Plant Biology
Summer (6–week session). 3 credits. Limited to 24 students.
Lecs, M–F 11:30–12:45; labs, M W 1:45–3:45. S. Williams.
Introductory botany, including plant identification. Emphasizes structure, reproduction, and classification of angiosperms. Seventy-five percent of the laboratory work is conducted outdoors in an area that surpasses most biological stations. Those who lack college-level biology are expected to work more closely with the instructor on supplemental instructional materials.

BIO S 246 Plants and Civilization
Spring. 3 credits.
Lecs, T R 11:15; disc, T or W 1:25 or W or R 12:20. D. M. Bates.
A consideration of the role that plants have played and continue to play in the evolution of human cultures. Emphasis is on the interactions between humans and the plant environment, the nature of plants and manner in which humans use and integrate them into their cultures, and the problems and concerns related to contemporary and future use of plant resources.

BIO S 248 Taxonomy of Vascular Plants
Spring. 4 credits. Prerequisite: one year of introductory biology. May not be taken for credit after Biological Sciences 243. S-U grades optional.
Lecs, M W F 9:05; lab, W or R 1:25–4:25.
J. I. Davis.
An introduction to the classification of vascular plants, with attention to the goals of taxonomy, the processes of plant evolution, and the means of analyzing evolutionary relationships among plants. The laboratory concentrates on methods of plant identification and presents an overview of vascular plant diversity, with particular attention to the flowering plants.

BIO S 341 Plant Physiology, Lectures
Fall. 3 credits. Prerequisites: one year of introductory biology, organic chemistry, and either concurrent enrollment in Biological Sciences 349 or written permission of instructor. May not be taken for credit after Biological Sciences 242 unless written permission is obtained from instructor.
Lecs, T R 10:10–11:25. A. T. Jagendorf.
The behavior, growth, transport processes, and environmental response of plants. Topics include membrane properties, solute and water transport, and function of osmotic forces; mineral and organic nutrition; stress resistance; growth and development controls; metabolism, including photosynthesis and respiration; and responses to environmental influences.

[BIO S 345 Plant Anatomy
Fall. 4 credits. Limited to 25 students. Prerequisite: one year of introductory biology or a semester of botany. Offered alternate years. Not offered 1992–93.
Lecs, M W 9:05; labs, M W 2–4:25.
D. J. Paolillo.
A descriptive course with equal emphasis on development and mature structure. Lecture, laboratory, and reading are integrated in a study guide. The laboratory offers the opportunity to develop the practical skills required to make anatomical diagnoses and to write anatomical descriptions.]

[BIO S 346 Algal Physiology
Fall. 3 credits. Prerequisites: one year of introductory biology for majors and Biological Sciences 242 or 341, or permission of instructor. S-U grades optional. Offered alternate years. Not offered 1992–93.
Lecs, T R 8:30–9:55. T. G. Owens.
This course takes an interdisciplinary approach to the study of algae with an emphasis on the physiology, biochemistry, and ecology of this diverse group of organisms. The algal classes are briefly described with consideration of traditional and emerging criteria for classification of the algae. The majority of the course focuses on interactions of algae with the physical/chemical environment, uptake of inorganic compounds, algal photosynthesis, metabolic strategies, and population dynamics of planktonic algae and benthic macrophytes. There is no laboratory section with this course.]

BIO S 349 Plant Physiology, Laboratory
Fall. 2 credits. Prerequisite: concurrent enrollment in Biological Sciences 341. May not be taken for credit after Biological Sciences 244.
Lab, W 1:25–4:25; disc, W 12:20.
H. C. Reiss.
Experiments exemplify concepts covered in Biological Sciences 341 and offer experience in a variety of biological and biochemical techniques, including use of small amounts of radioisotopes.

[BIO S 359 Biology of Grasses
Fall. 3 credits. Limited to 24 students. Prerequisite: one year of introductory biology or an introductory plant taxonomy course, or permission of instructor. S-U grades optional. Offered alternate years. Not offered 1992–93.
Lecs, T R 10:10; lab, T 1:25–4:25.
J. I. Davis.
Systematics and ecology of the graminoid plant families (grasses, sedges, and rushes), with principal emphasis on grasses. Major topics include taxonomy, phylogenetics, physiology, reproductive biology, ecotypic variation, speciation, biogeography, and population biology. The role of graminoids as ecosystem dominants, weeds, and the origins of cultivated species are discussed. Laboratory concentrates on the diversity of grasses.]

[BIO S 440 Plant Geography
Spring. 2 credits. Prerequisite: Biological Sciences 248 or equivalent. Recommended: Biological Sciences 378 or 463 or both. S-U grades optional, with permission of instructor. Offered alternate years. Not offered 1992–93.
Lecs, T R 10:10. Bailey Hortorium staff.
Patterns of distribution and variation of plant species and higher taxa, endemism and disjunction and their causes, influences of past continental movements and climatic change on plant distributions, geographical aspects of plant speciation, major biomes and floristic regions of the world, and methods of phytogeographic analysis.]

BIO S 441 Crop Plant Evolution
Fall. 2 credits. Prerequisite: an advanced-level course in the plant sciences with taxonomic content or permission of instructor. Offered alternate years.
Lecs, T R 11:15. D. M. Bates.
An integrated study of the systematics and evolution of agronomic and horticultural species. Processes of domestication, the evolutionary history of selected cultigens, the nature of weeds and land races, classification and nomenclature as applied to cultivated plants, and underexploited plant resources are among the topics considered.

[BIO S 442 Biology of Plant Species
Spring. 2 credits. Prerequisite: Biological Sciences 248 or equivalent. Recommended: Biological Sciences 378 and 463. S-U grades optional, with permission of instructor. Offered alternate years. Not offered 1992–93.
Lecs, T R 10:10. Bailey Hortorium staff.
A comprehensive introduction to the nature and origin of plant species, with coverage of plant evolutionary genetics, race formation and modes of speciation, evolution of reproductive isolating mechanisms, types of species complexes found in plants, cytogenetic aspects of plant speciation, natural hybridization and its consequences, and the origin and nature of higher taxa.]

[BIO S 443 Research Methods in Systematic Botany
Fall. 2 credits. Limited to 10 students. Prerequisite: Biological Sciences 248 or equivalent. Offered alternate years. Not offered 1992–93.
Lab, F 1:25–4:25; additional hours to be arranged. Bailey Hortorium staff.
An introduction to the methodology of plant systematic research: field studies; sampling and collecting methods; preparation of taxonomic revisions and monographs; numerical methods of data analysis; and laboratory methods in cytogenetics, comparative anatomy, and comparative chemistry, as applied to problems in plant systematics.]

BIO S 444 Plant Cell Biology
Fall. 4 credits. Limited to 24 students. Prerequisites: one year of introductory biology and permission of instructor.
Lecs, M W F 9:05; lab, M or W 1:25–4:25.
R. O. Wayne.
Evidence from microscopy, physiology, biochemistry, and molecular biology is used to try to unravel the mystery of the living cell. The dynamics of protoplasm, membranes, and the various organelles are studied. The mechanisms of cell growth and division, the relationship of the cytoskeleton to cell shape and motility, the interaction of the cell with its environment, and the processes that give rise to multicellular differentiated plants are investigated.

BIO S 445 Photosynthesis
Fall. 3 credits. Prerequisites: Chemistry 104 or 208, Mathematics 106 or 111, and either Physics 102 or 208 or permission of instructor. Offered alternate years.
Lecs, M W F 10:10. T. G. Owens.
A detailed study of the processes by which plants utilize light energy to grow. Structure of the photosynthetic apparatus, light absorption and antenna processes, photochemistry, and electron transport are emphasized. The course incorporates biophysical, biochemical, physiological, and molecular aspects of photosynthesis. Photosynthetic carbon metabolism is not covered in detail. Discussions include relevant material in bacterial, algal, and higher-plant photosynthesis.

[BIO S 446 Plant Cytogenetics
Fall. 3 credits. Limited to 18 students. Prerequisite: Biological Sciences 281 or equivalent. S-U grades optional. Offered alternate years. Not offered 1992–93.
Lecs, M W 9:05; lab, R 2–4:25. J. I. Davis.
An analysis of the cellular mechanisms of heredity, particularly the behavior of chromosomes, and the role of chromosome structure and behavior in plant evolutionary processes. The application of chromosomal studies to analyses of plant species biology and phylogenetics is also covered.]

[BIO S 447 Molecular Plant Systematics
Fall. 3 credits. Prerequisites: Biological Sciences 248, 281, and 330 or 331, or written permission of instructor. Offered alternate years. Not offered 1992–93.
Lecs, T R 10:10–11:30. J. J. Doyle.
The study of variation at the molecular level and its application to the taxonomy and evolution of plants, particularly angiosperms. Emphasis is on the use of molecular evidence, particularly DNA data, for reconstructing phylogenies. Theory and methods of phylogenetic reconstruction are discussed. The organization and evolution of nuclear, mitochondrial, and chloroplast genomes, genes, and gene products are described from the standpoint of their utility for addressing a diversity of evolutionary questions. These questions span the entire taxonomic spectrum, and include such issues as the origin of angiosperms, evolution of species related to important crop plants, and population studies of hybridization.]

BIO S 448 Plant Evolution and the Fossil Record
Spring. 3 credits. Prerequisite: Biological Sciences 241 or equivalent, or permission of instructor. Offered alternate years.
Lecs, T R 9:05; lab, R 12:20–2:15.
K. J. Niklas.
An introduction to evolution, surveying major changes in plants from the origin of life to the present. Emphasis is placed on plant form and function, adaptations to particular ecologic settings, and evolutionary theory as it relates to plants.

[BIO S 640 Applied Plant Anatomy
Spring. 3 credits. Prerequisites: Biological Sciences 345 or equivalent, and permission of instructor. Not offered 1992–93.
Lecs and discs, T R 9:05; lab, W 10:10–1:10 or by arrangement with instructor. Bailey Hortorium staff.
The use of anatomy in vascular plants for diagnosis of structure, taxonomic relationships, evolutionary sequences, and ecological adaptions, with emphasis on recent research. The laboratory provides experience in techniques and interpretation.]

BIO S 641 Laboratory in Plant Molecular Biology
Spring. 4 credits. Prerequisites: Biological Sciences 281 or equivalent, 330 or 331 or equivalent, and permission of instructor. S-U grades optional.
Lab, T 9:05–4:30. J. B. Nasrallah, M. R. Hanson, S. D. Tanksley, P. F. Palukaitis.
Selected experiments on genome organization, gene expression, and gene transfer in plants. The course emphasizes the application of molecular biology methodology to plant systems. Students may have additional lab time to complete assignments.

BIO S 642 Plant Mineral Nutrition (also Soil, Crop, and Atmospheric Sciences 642)
Spring. 3 credits. Prerequisite: Biological Sciences 341 or equivalent. Offered alternate years.
Lecs, M W F 10:10. L. V. Kochian, R. M. Welch.
A detailed study of the processes by which plants acquire and use mineral nutrients from the soil. Topics include the uptake, translocation, and compartmentation of mineral elements; root-soil interactions; the metabolism of mineral elements; the involvement of mineral nutrients in various physiological processes; and the nutrition of plants adapted to extreme environmental stresses (e.g., acid soils). Specific mineral elements are emphasized to illustrate these topics.

BIO S 643 Plant Physiology, Advanced Laboratory Techniques
Fall. 4 credits. Prerequisites: organic chemistry, biochemistry, and a course in plant physiology. S-U grades only.
Lab, T or W 8–5; disc, M 4:30–5:30.
A. T. Jagendorf.
An introduction to some modern methods in experimental plant biology. A partial list of

techniques used includes radioactivity measurements, infrared CO_2 analysis, gel electrophoresis and Western blots, cellular electrode measurements, microtiter plate technology for enzyme assays, sensitive growth measurements, HPLC and GC-MS, and computer interfacing with laboratory equipment.

[BIO S 644 Plant Growth and Development
Spring. 3 credits. Prerequisites: Biological Sciences 345 and either 242 or 341 or their equivalents, or written permission of instructor. Offered alternate years. Not offered 1992–93.
Lecs, M W F 9:05. P. J. Davies, D. J. Paolillo.
Explores the changes that occur during plant growth and development and their control: morphological and anatomical changes in apices, tissue differentiation, organ formation, embryo development, gene regulation, hormone action and interaction, the influence of light in development, flowering, fruiting, dormancy, abscission, and senescence.]

BIO S 645 Families of Tropical Flowering Plants
Fall. 1 credit. Prerequisite: written permission of instructor. S-U grades only. Offered alternate years.
Lec and disc, F 11:15. K. C. Nixon.
The families of flowering plants encountered solely or chiefly in tropical regions are considered in lectures, discussions, and demonstrations, with the aim of providing basic points of recognition for, and an understanding of, diversity and relationships in these families for the student venturing into the tropics.

BIO S 646 Families of Tropical Flowering Plants: Field Laboratory
Intersession. 3 credits. Limited to 20 students, with preference given to graduate students from member institutions of the Organization for Tropical Studies. Prerequisite: Biological Sciences 243 or 248 or equivalent. Recommended: Biological Sciences 645. S-U grades only. For more details and application, contact the L. H. Bailey Hortorium, 467 Mann Library. Offered alternate years.
K. C. Nixon.
An intensive orientation to families of tropical flowering plants represented in forests of the American tropics. Emphasis on field identification combined with laboratory analysis of available materials in a "whole-biology" context.

BIO S 647 Seminar in Systematic Botany
Fall or spring. 1 credit. May be repeated for credit. Prerequisite: written permission of course coordinator required for undergraduates. S-U grades optional.
Sem, T 11:15–1:10. Bailey Hortorium staff.
Lectures and discussions led by staff, visitors, and students on topics of current importance to systematic botany.

BIO S 648 Plant Biochemistry
Spring. 3 credits. Prerequisites: organic chemistry, biochemistry, and a course in plant physiology. Offered alternate years.
Lecs, M W F 9:05. A. T. Jagendorf and staff.
Selected areas of plant biochemistry are reviewed in the context of the plant life cycle and responses to the environment. Topics include metabolism of lipids, carbohydrates, organic acids, phenolic compounds, and proteins; nitrogen and sulfur assimilation; respiration; photosynthesis; development and replication of chloroplasts; and cell-wall composition and properties. Attention is paid to operation of control mechanisms.

[BIO S 649 Transport of Solutes and Water in Plants
Fall. 3 credits. Prerequisite: Biological Sciences 341 or equivalent. Offered alternate years. Not offered 1992–93.
Lecs, T R 10:10–11:30. R. M. Spanswick.
Transport of ions, water, and organic materials in plants; mechanisms of ion transport; relationships between ion transport and metabolism; ion uptake and transport in higher plants; phloem transport; and water relations of single cells and whole plants.]

BIO S 651 Quantitative Whole-Plant Physiology
Fall. 3 credits. Prerequisites: introductory physics, calculus, and plant physiology. S-U grades only. Offered alternate years.
Lecs, T R 10:10–11:30. R. M. Spanswick.
An exploration of the extent to which physiological processes and their interactions can be formulated in a quantitative manner and integrated to describe various aspects of plant behavior, including growth and yield. Consideration is given to characterization of the plant environment, energy balance, gas exchange, water relations, photosynthesis, respiration, translocation, nutrient supply, and the timing of developmental events.

BIO S 652 Plant Molecular Biology II
Spring. 1–4 credits (1 credit per section). Prerequisites: Biological Sciences 281, 330 or 331, and 653 (Section 01), or their equivalents. S-U grades optional.
A series of four-week modules on specialized topics. Coordinator: S. H. Howell.

Section 01 Molecular Plant-Pathogen Interactions (also Plant Pathology 662)
1 credit.
Lecs, M W F 10:10 (12 lecs) Jan. 27–Feb. 22. P. F. Palukaitis, O. C. Yoder.
An examination of the molecular properties that control the development of host-parasite interactions in both microorganisms (viruses, bacteria, and fungi) and higher plants. Contemporary theories describing the genetic mechanisms of pathogenesis and resistance are discussed.

Section 02 Molecular Biology of Plant Organelles
1 credit. S-U grades optional.
Lecs, M W F 1:25 (12 lecs) Jan. 27–Feb. 22. M. R. Hanson (even years), D. B. Stern (odd years).
An in-depth examination of the molecular biology of plant mitochondria (even years) and plastids (odd years). Topics include the organization and expression of organelle genomes, RNA editing, organelle transformation, expression of nuclear genes for organelle proteins. Special topics include cytoplasmic male sterility and gene regulation during plastid development.

Section 03 Molecular Aspects of Plant Development II
1 credit. S-U grades optional.
Lecs, M W F 10:10 (12 lecs) Feb. 24–Mar. 29. S. H. Howell.
A systems approach to the study of plant development from a molecular perspective. Topics include *Arabidopsis* as a model plant system; molecular genetics of flowering, seed development, and germination; shoot and root development; senescence; and fruit ripening.

Section 04 Molecular Plant-Microbe Interactions
1 credit. S-U grades optional.
Lecs, M W F 10:10 (12 lecs) Mar. 31–Apr. 26. S. C. Winans, T. A. LaRue.
Course focuses on the interactions of *Agrobacteria* and *Rhizobia* with plants. Topics on *Agrobacterium*-plant interactions include plant-microbe recognition mechanisms, T-DNA transfer process, oncogenesis and use of *Agrobacterium* to produce transgenic plants. Topics on *Rhizobium*-plant interactions include regulation of nitrogenase activity and expression, organization and function of the *sym* plasmid, nodule development, and plant genetics involved in plant-microbe interaction.

BIO S 653 Plant Molecular Biology I
Fall. 1–4 credits (1 credit per section). Prerequisites: Biological Sciences 281 and 330 or 331, or their equivalents. S-U grades optional.
A series of four-week modules on specialized topics. Coordinator: S. H. Howell.

Section 01 Concepts and Techniques in Plant Molecular Biology
1 credit.
Lecs, M W F 10:10 (12 lecs) Sept. 2–Sept. 28. R. L. Last, R. Wu.
A review and update on molecular biology concepts relevant to plant sciences including DNA synthesis, RNA transcription and processing, and protein structure and translation. Methods applicable to plant molecular biology are described including isolation of nucleic acids, gel electrophoresis, recombinant DNA techniques, mutant production, DNA-protein interactions, and use of antibodies.

Section 02 Plant Biotechnology (also Plant Breeding 653 and Plant Pathology 663)
1 credit.
Lecs, M W F 10:10 (12 lecs) Sept. 2–Sept. 28. M. Zaitlin, E. D. Earle.
Applications of molecular biology and tissue culture to plant biotechnology are studied. Topics covered include gene introduction and tissue culture technologies; use of somaclonal variation; and use of cultured plant materials and transgenic plants to obtain resistance to insects, plant diseases, and herbicides, and to improve nutritional and food processing qualities. Regulatory and social issues relating to plant biotechnology are discussed.

Section 03 Plant Genome Organization and Function (also Plant Breeding 653)
1 credit.
Lecs, M W F 10:10 (12 lecs) Oct. 5–Nov. 2. S. D. Tanksley.
Molecular structure and evolution of plant nuclear genomes are explored. Topics covered include mechanisms for packaging DNA into chromosomes, molecular structure of telomeres and centromeres, DNA replication and methylation, and molecular biology of plant transposons. Methods for genetic and physical mapping of plant genomes are discussed as well as applications of mapping tools for gene isolation and plant breeding.

Section 04 Molecular Aspects of Plant Development I
1 credit.
Lecs, M W F 10:10 (12 lecs) Nov. 4–Dec. 4. J. B. Nasrallah.
The regulation of plant nuclear gene expression during development and in response to environmental stimuli is explored. Topics include the use of classical and molecular genetics, transposable elements, and transgenic plants to identify and characterize *cis*- and trans-acting elements responsible for the regulation of selected genes.

[BIO S 654 Plant Nomenclature
Spring. 1 credit. Prerequisite: written permission of instructor. S-U grades optional. Offered alternate years. Not offered 1992–93.
Lec and disc to be arranged. R. P. Korf.
An analysis of the International Code of Botanical Nomenclature and its application to various plant groups.]

BIO S 656 Topics in Paleobotany
Spring. 1 credit. Prerequisite: Biological Sciences 448 or equivalent background in evolution or written permission of instructor.
Lab and disc to be arranged. K. J. Niklas.
A series of selected topics to provide a background in plant evolution, paleobotanical literature, and evolutionary theory. Among the topics discussed are the origin of a terrestrial flora, the evolution of the seed plants, and the origin and adaptive radiation of the angiosperms.

[BIO S 657 Literature of Taxonomic Botany
Fall. 1 credit. Prerequisite: written permission of instructor. S-U grades optional. Offered alternate years. Not offered 1992–93.
Lec and disc, R 10:10. Bailey Hortorium staff.
A survey of the basic reference works in taxonomy from the pre-Linnaean literature drawn on by Linnaeus to contemporary publications, with comments on the peculiarities of the books (when appropriate), publication dates, typographic devices, and intricacies of bibliographic citation.]

BIO S 740 Plant Biology Seminar
Fall and spring. No credit (no official registration). Required of graduate students doing work in plant biology.
Sem, F 11:15. Staff.
Lectures on current research in plant biology, presented by visitors and staff.

BIO S 742 Current Topics in Plant Molecular Biology
Fall and spring. 1 credit. Limited to 20 students. Primarily for graduate students, with preference given to majors or minors in plant molecular biology; written permission of instructor required for undergraduates. S-U grades only.
Sem, 1 hour each week to be arranged. Staff.
A seminar with critical presentation and discussion by students of original research papers concerning the molecular biology of plants. Staff direction varies each year and is announced a semester in advance.

BIO S 749 Graduate Research in Botany
Fall or spring. Variable credit. May be repeated for credit. S-U grades optional.
Hours to be arranged. Staff.
Similar to Biological Sciences 499 but intended for graduate students who are working with faculty members on an individual basis.

BIO S 840 Current Topics in Plant Physiology
Fall or spring. 2 credits. May be repeated for credit. S-U grades only.
Sem to be arranged. Staff.
Seminar reports by graduate students on current literature in experimental plant physiology or related areas.

Related Courses in Other Departments

Introductory Mycology (Plant Pathology 309)

Marine Botany: Ecology of Marine Plants (Biological Sciences 449)

Mycology (Plant Pathology 709)

Mycology Conferences (Plant Pathology 649)

Plant Ecology, Lectures and Laboratory (Biological Sciences 463 and 465)

Plant Ecology Seminar (Biological Sciences 669)

Taxonomy of Fungi (Plant Pathology 729)

Teaching Experience (Biological Sciences 498)

Undergraduate Research in Biology (Biological Sciences 499)

ECOLOGY AND EVOLUTIONARY BIOLOGY

BIO S 154 The Sea: An Introduction to Oceanography (also Geological Sciences 104)
Spring. 3 credits. S-U grades optional, with permission of either instructor.
Lecs, M W 11:15; lab, W 7:30–10 p.m. or M W R or F 2–4:25. Evening prelims: Feb. 23 and Apr. 8. C. H. Greene, W. M. White.
The oceans remain one of the last frontiers, yet they affect our everyday lives in many subtle ways. This course surveys what is known of the physics, chemistry, geology, and biology of the oceans. Topics include: seafloor spreading and plate tectonics; geology and biology of mid-ocean ridges; biological and geological control on the chemistry of seawater; ocean currents and circulation; the oceans and climate, including El Niño, the greenhouse effect, and the Ice Ages; ecology of open-ocean, ocean-bottom, and near-shore communities; coastal processes; marine pollution and waste disposal; mineral and biological resources of the sea; and Law of the Sea. At the level of *Scientific American*.

BIO S 261 Ecology and the Environment
Fall. 4 credits. Prerequisite: one year of introductory biology. S-U grades optional.
Lecs, M W F 11:15; disc, W or R 1:25, 2:30, or 3:35. Evening prelim R, Oct. 8. T. E. Dawson, R. B. Root.
An introduction to principles of ecology concerning the interactions between organisms and their environment. The course deals with both terrestrial and aquatic ecology, drawing examples from both plant and animal studies. Phenomena that occur at the individual population, community, and ecosystem levels of organization are discussed. These principles are extensively applied to current environmental problems and issues.

BIO S 263 Field Ecology
Fall. 2 credits. Limited to 20 students. Prerequisite: concurrent or previous enrollment in Biological Sciences 261.
Lec, R 1:25; lab, F 12:20–5. One weekend field trip to the Hudson Valley; small fee for field trip. R. B. Root.
Field exercises designed to give students direct experience with field work, with emphasis on developing observational skills, journal keeping, and a landscape perspective. Topics include plant succession, niche relationships of insects, influence of herbivores and competition on plant performance, decomposition of soil litter, sampling plankton, and use of scientific collections.

[BIO S 272 Functional Ecology: How Animals Work
Spring. 4 credits. Enrollment limited to 60 students (15 per laboratory section); preference given to sophomores and juniors. Prerequisite: one year of introductory biology for majors. Offered alternate years. Fee, $15. Not offered 1992–93.
Lecs, M W F 9:05; lab, M T W or R 1:25–4:25. F. H. Pough.
An introductory course for students interested in organismal biology. The features of the physical environment that are important to insects and vertebrates are used to illustrate the interaction of physiological, behavioral, and morphological characteristics in organismal activity and homeostasis. Laboratories include a survey of the diversity of endothermal and ectothermal animals, ecophysiological measurements, and measurements of important environmental parameters in local habitats. This course uses live and preserved vertebrate animals for field observations and laboratory exercises.]

BIO S 274 Functional and Comparative Morphology of Vertebrates
Spring. 4 credits. Prerequisite: one year of introductory biology. Offered alternate years.
Lecs, M W 12:20; labs, M W or T R 1:25–4:25. Fee, $15. D. K. McClearn.
An exploration of the relations between form and function in biological systems with an emphasis on trends in vertebrate evolution. Lectures integrate data from topics such as locomotion, feeding, size, and scaling with issues of historical importance and current interest (e.g., correlation of body parts, adaptationist explanations, developmental constraints, criteria for determining biomechanical and energetic "efficiency"). Laboratories include dissections of preserved vertebrate animals and noninvasive live animal demonstrations (motion analysis, surface electrode, and force-plate recordings).

[BIO S 275 Human Biology and Evolution (also Anthropology 275 and Nutritional Sciences 275)
Fall. 3 or 4 credits (4 credits with discussion). S-U grades optional, with permission of either instructor. Offered alternate years. Not offered 1992–93.
Lecs, M W F 10:10; optional disc to be arranged. K. A. R. Kennedy, J. D. Haas.
An introduction to the biology of *Homo sapiens* through an examination of human evolution, biological diversity, and modes of adaptation to past and present environments. Evolutionary theory is reviewed in relation to the current evidence from the fossil record and studies of the evolution of human behavior. A survey of human adaptation covers a complex of biological and behavioral responses to environmental stress. Human diversity is examined as the product of long-term evolutionary forces and short-term adaptive responses. Topics such as creationism, the Piltdown fraud, the sociobiology

debate, genetic engineering, race and IQ, and racism are presented as examples of current issues in human biology. These topics and others are the focus of the optional one-hour weekly discussions.]

[BIO S 371 Human Paleontology (also Anthropology 371)
Fall. 4 credits. Prerequisite: one year of introductory biology or Anthropology 101 or permission of instructor. Offered alternate years. Not offered 1992–93.
Lecs, M W F 2:30; lab, one hour each week to be arranged; occasional field trips. K. A. R. Kennedy.
A broad survey of the fossil evidence for human evolution with special attention to skeletal and dental anatomy, geological contexts, paleoecology, dating methods, archaeological associations, and current theories of human origins and physical diversity.]

[BIO S 373 The Invertebrates: Form, Function, and Evolution
Fall. 4 credits. Limited to 30 students. Prerequisite: one year of introductory biology for majors. Offered alternate years. Not offered 1992–93.
Lecs, M W F 10:10; lab, W 1:25–4:25; 1 optional weekend field trip to Shoals Marine Laboratory. $50 fee for optional field trip. Staff.
An introduction to the evolution of form and function among the major invertebrate phyla. Strong emphasis is placed on the integration of evolutionary pasts and ecological presents to produce extant forms. Lectures draw heavily on original literature from the field of invertebrate functional morphology. Laboratory dissections and demonstrations often involve live marine and freshwater invertebrates.]

BIO S 378 Evolutionary Biology
Spring. 4 credits. Enrollment may be limited. Prerequisite: one year of introductory biology or permission of instructor. S-U grades optional.
Lecs, M W F 10:10; disc, one hour each week to be arranged. Evening prelims: Feb. 23 and Mar. 30. R. G. Harrison, M. A. Geber.
The course considers explanations for patterns of diversity and for the apparent "good fit" of organisms to the environment. Topics covered include the genetic and developmental basis of evolutionary change, processes at the population level, the theory of evolution by natural selection, levels of selection, concepts of fitness and adaptation, modes of speciation, long-term trends in evolution, rates of evolution, and extinction.

[BIO S 455 Insect Ecology (also Entomology 455)
Fall. 3 credits. Prerequisites: Biological Sciences 261 and Entomology 212 or their equivalents. Offered alternate years. Not offered 1992–93.
Lecs, W F 11:15; disc, 1 hour each week to be arranged. R. B. Root.
Ecological and evolutionary principles are integrated by thorough examination of outstanding investigations. Topics include the factors responsible for the great diversity of insects, adaptive syndromes associated with climate, natural history of arthropod guilds, impact of insects on terrestrial vegetation, population regulation, and the contrast between natural and managed ecosystems.]

BIO S 456 Stream Ecology (also Entomology 456)
Spring. 3 credits. Prerequisite: Recommended: Biological Sciences 261. S-U grades optional, with permission of instructor. Offered alternate years.
Lecs, T R 9:05; labs, T W or R 1:25–4:25. B. L. Peckarsky, C. M. Pringle.
Lecture addresses the question, How does flow influence the structure and function of stream ecosystems? Aspects of structure include channel morphometry; physical and chemical gradients; and plant, invertebrate, and fish community structure. Functional analyses include nutrient cycling and downstream transport, trophic dynamics, processes affecting plant and animal colonization and succession, and the impacts of anthropogenic disturbances. Laboratory includes three or four class projects using descriptive, behavioral, and experimental techniques in the laboratory and the field to test hypotheses discussed in lecture.

BIO S 457 Limnology: Ecology of Lakes, Lectures (formerly Limnology, Lectures)
Fall. 3 credits. Prerequisite: Biological Sciences 261 or written permission of instructor. Recommended: introductory chemistry.
Lecs, M W F 11:15. N. G. Hairston, Jr.
The study of continental waters, with emphasis on lakes and ponds. Factors regulating nutrients, population and community dynamics of freshwater organisms, and physical and chemical properties of fresh water are considered.

BIO S 459 Limnology: Ecology of Lakes, Laboratory (formerly Limnology, Laboratory)
Fall. 2 credits. Prerequisite: concurrent or previous enrollment in Biological Sciences 457.
Lab, T W or R 1:25–4:25; 1 weekend field trip. N. G. Hairston, Jr. and staff.
Laboratories and field trips devoted to studies of the biological, chemical, and physical properties of lakes and other freshwater environments. Vertebrate dissection (fish) during one laboratory exercise and during a portion of weekend field trip.

[BIO S 460 Physiological Plant Ecology
Spring. 4 credits. Limited to 25 students. Prerequisite: Biological Sciences 261 or introductory plant physiology. S-U grades optional, with permission of instructor. Offered alternate years. Not offered 1992–93.
Lecs, T R 11:15; disc, R 1:25; lab, T 1:25–4:25. Fee, $15. T. E. Dawson.
A detailed survey of the physiological approaches used in understanding the relationships between plants and their environment. Lectures explore physiological adaptation; limiting factors; resource acquisition and allocation; photosynthesis, carbon, and energy balance; water use and water relations; nutrient relations; linking physiology, development, and morphology; stress physiology; life history and physiology; the evolution of physiological performance; and physiology at the population, community, and ecosystem levels. Readings draw from the primary literature and textbooks. Laboratories apply physiological techniques to specific ecological problems and cover aspects of experimental design and computer-aided data analysis. Some laboratories may run past the three-hour period.]

[BIO S 461 Population and Evolutionary Ecology
Fall. 4 credits. Prerequisite: Biological Sciences 261 or 378. S-U grades optional. Offered alternate years. Not offered 1992–93.
Lecs, M W F 9:05; lab, M or T 1:25–4:25. D. W. Winkler and staff.
Problems of ecology are viewed from an evolutionary perspective, exploring issues of adaptation and fitness definition by developing advanced understanding of demography and interspecific interactions. Blending theory and empirical findings, the course explores population dynamics; life-history theory; dispersal; competition; predation; parasite-host coevolution; mutualisms; and sexual, kin, and group selection. Methods of estimation and analysis are learned in laboratory.]

[BIO S 462 Marine Ecology
Spring. 3 credits. Prerequisite: Biological Sciences 261. Offered alternate years. Not offered 1992–93.
Lecs and disc, M W F 10:10. Staff.
Lectures and discussion focus on current research in broad areas of marine ecology with an emphasis on processes unique to marine systems. A synthetic treatment of multiple levels of organization in marine systems including organismal, population, community, ecosystems, and evolutionary biology.]

BIO S 463 Plant Ecology and Population Biology, Lectures
Fall. 3 credits. Prerequisite: introductory course in ecology or evolution (e.g., Biological Sciences 261 or 378), or permission of instructor. Recommended: some taxonomic familiarity with vascular plants and concurrent enrollment in Biological Sciences 465. Offered alternate years.
Lecs, M W F 11:15. M. A. Geber, P. L. Marks.
This course examines the biological and historical factors affecting the structure of plant communities, and the distribution, abundance, and population dynamics of individual species. The influence of the environment, disturbance history, competition, and herbivory on the organization of plant communities are considered first. Plant populations are then studied through an analysis of plant life histories and plant-plant and plant-animal interactions. Throughout the course an attempt is made to blend empirical patterns, experimental results, and theory. Readings are drawn from the primary literature.

BIO S 464 Microevolution and Macroevolution (also Entomology 464)
Spring. 4 credits. Limited to 25 students. Prerequisite: Biological Sciences 378 or permission of instructor. S-U grades optional, with permission of instructor. Offered alternate years. Next offered spring 1996, and alternate spring semesters thereafter.
Lecs, T R 10:10–11:30; disc, one hour each week to be arranged. A. R. McCune, S. Via.
An advanced course in evolutionary biology integrating macroevolutionary and microevolutionary approaches. Areas of emphasis include patterns and processes of speciation, phylogeny reconstruction in populations and higher taxa, the origins and fate of variation, and causes of major evolutionary transitions. Discussion of these problems involve data and approaches from genetics, morphology,

systematics, paleobiology, development, and ecology.

BIO S 465 Plant Ecology and Population Biology, Laboratory
Fall. 1 credit. Prerequisite: concurrent enrollment in Biological Sciences 463. Offered alternate years.
Lab, F 12:05–5. M. A. Geber, P. L. Marks.
Laboratory and field exercises designed to give firsthand experience with the ecology and population biology of plants. Emphasis is on making observations and measurements of plants in the field and greenhouse, and on simple data analysis.

[BIO S 467 Physiological Animal Ecology
Fall. 4 credits. Limited to 25 students. Prerequisite: Biological Sciences 272 or 274. Offered alternate years. Not offered 1992–93.
Lecs, T R 11:15; disc, R 1:25; lab, T 1:25–4:25. Fee $15. Staff.
The course examines how living organisms function in their environment. Classical physiological topics including respiration, circulation, excretion, osmoregulation, metabolism, and integration are addressed in evolutionary and ecological contexts. The theme is organismal adaptation and response to major environmental factors such as temperature, food availability, oxygen, and water. Laboratory exercises demonstrate physiological principles discussed in lectures, cover current experimental physiological methods and techniques, and emphasize experimental design. Some laboratories may run beyond the stated ending time. During the second half of the semester students design and execute an independent research project. Results of this project are presented during the final laboratory section. Live vertebrate animals are used for field observations and laboratory exercises.]

[BIO S 470 Ecological Genetics (also Entomology 470)
Spring. 4 credits. Prerequisite: Biological Sciences 378 or permission of instructor. S-U grades optional. Offered alternate years. Not offered 1992–93. Next offered spring 1995, and alternate spring semesters thereafter.
Lecs, T R 10:10–11:30; disc, one hour each week to be arranged. S. Via.
A study of the relationships between genetic and ecological processes in populations. Topics include consequences of genetic variation in age-structured populations; demographic concepts of fitness; evaluation of methods for measuring genetic variation and natural selection on ecologically important traits; genetics of competitive ability and predator avoidance; genetic and ecological aspects of phenotypic plasticity; character displacement; maintenance of genetic variability; limits to selection. How theory can be used to formulate hypotheses about evolutionary mechanisms in natural populations is considered and experiments designed to test such hypotheses are evaluated.]

[BIO S 471 Mammalogy
Fall. 4 credits. Recommended: Biological Sciences 274. S-U grades optional, with permission of instructor. Offered alternate years. Not offered 1992–93.
Lecs, M W F 9:05; lab, M T or W 1:25–4:25; 1 weekend field trip required. Fee, $15.
D. K. McClearn.
Lectures on the evolution, classification, distribution, and adaptations of mammals. Laboratory and fieldwork on systematics, ecology, and natural history of mammals of the world, with primary emphasis on the North American fauna. Systematics laboratories held in the museum at Research Park. Live animals are studied in the field and are sometimes used in the laboratory for nondestructive demonstrations or experiments. The systematics laboratory exercises are based on museum specimens.]

BIO S 472 Herpetology
Spring. 4 credits. Recommended: Biological Sciences 274. S-U grades optional, with permission of instructor. Offered alternate years.
Lecs and labs, T R 12:20–4:25; occasional field trips and special projects. Fee, $15.
F. H. Pough.
Lectures cover various aspects of the biology of amphibians and reptiles, including evolution, zoogeography, ecology, behavior, and physiology. Laboratory includes systematics, functional morphology, and behavior. Live animals are studied in the field and are sometimes used in the laboratory for nondestructive demonstrations or experiments. The systematics laboratory exercises are based on museum specimens.

BIO S 473 Ecology of Agricultural Systems (also Soil, Crop, and Atmospheric Sciences 473)
Fall. 3 credits. Limited to 45 students. Prerequisite: Biological Sciences 261 or permission of instructor. S-U grades optional. Offered alternate years.
Lecs and discs, T R 2:30–3:45. During the first 6 weeks of class the Thursday meetings may run to 5:00 because of field trips. A. G. Power, T. W. Scott.
Analysis of the ecological processes operating in agricultural systems, with an emphasis on the interactions between organisms. Topics include nutrient dynamics in agroecosystems, plant competition and facilitation, intercropping, the ecology of species invasions, mutualism in agroecosystems, plant-herbivore relations, plant-pathogen interactions, biological pest control, and evolutionary processes in agriculture. Case studies from both the tropics and the temperate zone are used to illustrate important concepts.

BIO S 474 Laboratory and Field Methods in Human Biology (also Anthropology 474)
Spring. 5 credits. Limited to 16 students. Prerequisite: one year of introductory biology or Anthropology 101 or permission of instructor. Offered alternate years.
Lecs and labs, T R 10:10–12:05; additional hours to be arranged. Independent research project required.
K. A. R. Kennedy.
Practical exercises and demonstrations of modern approaches to the methodology of physical anthropology. Emphasis on comparative human anatomy, osteology, description of skeletal and living subjects, paleopathology, skeletal maturation, and relevant field techniques for the archaeologist and forensic anthropologist. There is a dissection of a profused (dead) nonhuman primate, usually a macaque or baboon. Students attend demonstrations of the dissection prepared by the presector (a hired graduate student).

BIO S 475 Ornithology
Fall. 4 credits. Limited to 30 students, with permission of instructor obtained by preregistering in E241 Corson. Recommended: Biological Sciences 274. S-U grades optional, with permission of instructor. Offered alternate years. Fee, $15.
Lecs and labs, T R 12:20–4:25; occasional field trips and special projects.
D. W. Winkler.
Lectures cover various aspects of the biology of birds, including anatomy, physiology, systematics, evolution, behavior, ecology, and biogeography. Laboratory includes dissection of dead material, studies of skeletons and plumages, and specimen identification of avian families of the world and species of New York. Independent projects emphasize research skills.

BIO S 476 Biology of Fishes
Fall. 4 credits. Recommended: Biological Sciences 272 or 274 or equivalent experience in vertebrate zoology. S-U grades optional, with permission of instructor. Offered alternate years.
Lecs, M W F 9: 05; lab, M 1:25–4:25. A small lab fee may be required.
A. R. McCune.
An introduction to the study of fishes: their structure, evolution, distribution ecology, physiology, behavior, classification, and identification, with emphasis on local species. Live animals are studied in the field and are sometimes used in the laboratory for nondestructive demonstrations or experiments. The systematics and dissection laboratories use preserved specimens.

BIO S 478 Ecosystem Biology
Spring. 4 credits. Prerequisite: Biological Sciences 261 or equivalent. S-U grades optional. Offered alternate years.
Lecs and discs, T R 10:10–12:05.
R. W. Howarth.
Analysis of ecosystems in terms of energy flow and nutrient cycles, emphasizing an experimental approach and comparative aspects of terrestrial, freshwater, and marine ecosystems. Consideration of anthropogenic effects on ecosystems, such as from acid precipitation and offshore oil pollution. Analysis of climate change and regional environmental change from an ecosystem perspective.

[BIO S 479 Paleobiology (also Geological Sciences 479)
Fall. 3 credits. Prerequisites: one year of introductory biology for majors and either Biological Sciences 272 or 274, Geological Sciences 375, Biological Sciences 373, or permission of instructor. Offered alternate years. Not offered 1992–93.
Lecs, M W F 12:20. J. L. Cisne and staff.
A survey of the major groups of organisms and their evolutionary histories. Intended to fill out the biological backgrounds of geology students and the geological backgrounds of biology students concerning the nature and significance of the fossil record for their respective studies.]

[BIO S 660 Field Studies in Ecology and Systematics
Spring. Variable credit. Prerequisites: Biological Sciences 261, a taxon-oriented course, and permission of instructor. Estimated cost of room and board (exclusive of transportation) to be announced. Not offered 1992–93.
Lecs and labs to be arranged. Staff.

This course provides students an opportunity to learn techniques and a new biota by participating in an intensive series of field exercises. An extended field trip is scheduled during either intersession or spring break. The region visited, trip objectives, and other details are announced by the instructor in charge in the division's catalog supplement issued at the beginning of the semester. Meetings on campus are devoted to orientation and reports on completed projects.]

BIO S 661 Environmental Policy (also ALS 661 and Biology and Society 461)
Fall and spring. 3 credits each term. (Students must register for 6 credits each term, since an "R" grade is given at the end of the fall term.) Limited to 12 students. Prerequisite: permission of instructor.
Sem, R 2:30–4:30. D. Pimentel.
This course uses an interdisciplinary approach to focus on complex environmental and energy problems. Ten to twelve students, representing several disciplines, investigate significant environmental problems. The research team spends two semesters preparing a scientific report for publication in *Science* or *BioScience*.

BIO S 662 Mathematical Ecology (also Statistics and Biometry 662)
Spring. 3 credits. Prerequisites: one year of calculus and a course in statistics. Recommended: a general ecology course. S-U grades optional, with permission of instructor. Offered alternate years.
Lecs, M W F 12:20. C. Castillo-Chavez and staff.
Mathematical and statistical analysis of populations and communities: theory and methods. Spatial and temporal pattern analysis. Deterministic and stochastic models of population dynamics. Model formulation, parameter estimation, simulation, and analytical techniques.

BIO S 664 Seminar in Insect-Plant Interactions (also Entomology 664)
Spring. 2 credits. Intended for seniors and graduate students. Limited to 15 students. Prerequisites: courses in entomology, ecology, evolution, and organic chemistry and written permission of instructor. S-U grades optional. Offered alternate years.
Sem, 1 evening each week to be arranged. P. P. Feeny.
Presentations and discussions by students on the evolution of patterns of interaction between plants and insects, emphasizing critical evaluation of concepts and evidence.

BIO S 665 Limnology Seminar
Spring. 1 credit. May be repeated for credit. Primarily for graduate students; written permission of instructor required for undergraduates. S-U grades optional. Offered alternate years.
Sem to be arranged. N. G. Hairston, Jr.
A seminar course on advanced topics in freshwater ecology.

[BIO S 668 Comparative Biogeochemistry
Fall. 4 credits. Prerequisite: solid background in ecology, environmental chemistry, or related environmental science. Permission of instructor required for undergraduates. S-U grades optional. Offered alternate years. Not offered 1992–93. Next offered spring 1994 and alternate spring semesters thereafter.
Lecs and discs, T R 10:10–12:05. R. W. Howarth.
Lectures cover the biotic controls on the chemistry of the environment. Emphasis is on cycles of major elements and minor elements globally and in selected ecosystems, stressing the coupling of element cycles. A comparative approach is used to illustrate similarities and differences in element cycling among ecosystems, with slight emphasis on aquatic ecosystems. Analysis of both theoretical and applied issues, including global atmospheric changes and factors controlling the acidification of lakes.]

BIO S 669 Plant Ecology Seminar
Spring. 1 credit. May be repeated for credit. Suggested for students majoring or minoring in plant ecology. S-U grades optional.
Sem to be arranged. Staff.
Includes review of current literature, student research, and selected topics of interest to participants.

BIO S 670 Graduate Seminar in Vertebrate Biology
Fall or spring. 1 credit. May be repeated for credit. Primarily for graduate students; written permission of instructor required for undergraduates. S-U grades only.
Sem to be arranged. Staff.
Seminar presentations and discussions by students on areas of current research in vertebrate biology. Topics vary from semester to semester.

[BIO S 672 Graduate Seminar in Physiological Ecology
Spring. 2 credits. Limited to 12 students. Prerequisite: a course in plant or animal physiology, especially Biological Sciences 460 or 467. May be repeated for credit. Permission required for undergraduates. S-U grades only. Offered alternate years. Not offered 1992–93.
Sem, 2 hours each week to be arranged. F. H. Pough, T. E. Dawson, B. F. Chabot.
Discussion of topics on water balance, energetics, and temperature regulation emphasize parallels and contrasts in the relations of animals and plants to their biophysical environments. Each student leads a discussion and prepares a written review of a topic, drawing on the primary literature of his or her own research interests.]

BIO S 673 Human Evolution: Concepts, History, and Theory (also Anthropology 673)
Fall. 3 credits. Prerequisite: one year of introductory biology, Anthropology 101, or permission of instructor. Offered alternate years.
Lec, M 2:30; sem-disc, W 7:30–9:30 p.m. K. A. R. Kennedy.
The historical background of present-day concepts of man's evolutionary variations and adaptations in space and time is surveyed. The formation of biological anthropology as an area of scientific inquiry within the social and biological sciences is reviewed. Students select their own topics within a broad range of readings in the history of Western concepts of human origins, diversity, and place in nature.

[BIO S 674 Principles of Systematics (also Entomology 674)
Spring. 4 credits. Limited to 15 students. Prerequisite: permission of instructor. Recommended: an introductory biological systematics course. Offered alternate years. Not offered 1992–93.
Lecs, discs, and labs, M W 1:25–4:25. Q. D. Wheeler and staff.
An introduction to modern theory and methods of systematic biology. Lectures are on theoretical systematics and include species concepts, classification, phylogenetics, and biogeography. Laboratories include modern methods of analysis of data, including cladistic hand and computer methods and numerical methods. Laboratory grade is based in part on a final paper.]

BIO S 760 Special Topics in Evolution and Ecology
Fall or spring. 1–3 credits. May be repeated for credit. Enrollment limited. S-U grades optional, with permission of instructor.
Hours to be arranged. Staff.
Independent or group intensive study of special topics of current interest. Content varies and is arranged between student and staff member.

[BIO S 765 Autecology/Population Ecology
Fall. 4 credits. Prerequisite: Biological Sciences 261 or equivalent. S-U grades optional. Not offered 1992–93.
Lecs and discs, T R 10:10–12:05. Staff.
Comparison of the responses and adaptations of organisms to environments in selected ecosystems. Emphasis on similarities and differences in molecular and organismal mechanisms by which plants and animals cope with their environments. Critical examination of the properties and dynamics of populations. Emphasis on theories of adaptation, population structures, dynamics, and regulation.]

[BIO S 766 Communities and Ecosystems
Spring. 4 credits. Prerequisite: Biological Sciences 261 or equivalent. S-U grades optional. Not offered 1992–93.
Lecs, T R 10:10–12:05. Staff.
Structure, dynamics, and evolution of natural communities; species diversity; niches and gradient relations; and succession, climax, and disturbance. Comparative aspects of terrestrial, marine, and freshwater communities. Analysis of ecosystems in terms of energy flow, biogeochemistry, and model systems. Emphasis on functional and structural properties of communities and ecosystems.]

BIO S 767 Current Topics in Ecology and Evolutionary Biology
Fall. 4 credits. Prerequisites: Biological Sciences 261 and 378 or their equivalents. S-U grades optional.
Lecs and discs, T R 10:10–12:05. P. P. Feeny and staff.
Critical evaluation and discussion of theory and research in ecology and evolutionary biology. Lectures by faculty and student-led discussions of topics in areas of current importance.

Related Courses in Other Departments

Advanced Soil Microbiology (Soil, Crop, and Atmospheric Sciences 666)

Advanced Work in Parasitology (Veterinary Microbiology, Immunology, and Parasitology 737)

Animal Social Behavior (Biological Sciences 427)

Biology of Plant Species (Biological Sciences 442)

Early People: The Archaeological and Fossil Record (Anthropology 203 and Archaeology 203)

Marine Sciences Courses (Biological Sciences 363–370, 477)

Plant Geography (Biological Sciences 440)

Related Courses in Entomology (Entomology 212, 331, 332, 370, 453, 471, 621, 631, 633, 634, 636, 672)

Related Courses in Natural Resources (Natural Resources 270, 302, 603)

Taxonomy of Vascular Plants (Biological Sciences 248)

Teaching Experience (Biological Sciences 498)

Undergraduate Research in Biology (Biological Sciences 499)

Undergraduate Seminar in Biology (Biological Sciences 400)

Veterinary Parasitology (Veterinary Microbiology, Immunology, and Parasitology 510)

GENETICS AND DEVELOPMENT

BIO S 281 Genetics
Fall, spring, or summer (8-week session). 5 credits. Not open to freshmen in fall semester. Enrollment may be limited to 200 students. Prerequisite: one year of introductory biology or equivalent; written permission of instructor required for students who have taken Biological Sciences 282. No admittance after first week of classes.

Lecs, T R 10:10–12:05; lab, T W or F 2:30–4:25; additional hours to be arranged. Students do not choose lab sections during course enrollment; lab assignments are made during first day of classes.

T. D. Fox, M. L. Goldberg, R. J. MacIntyre.

A general study of the fundamental principles of genetics in eukaryotes and prokaryotes. Discussions of gene transmission, gene action and interaction, gene linkage and recombination, gene structure, gene and chromosome mutations, genetic aspects of differentiation, genes in populations, breeding systems, and extrachromosomal inheritance. Aspects of recombinant DNA technology are discussed. In the laboratory, students perform experiments with microorganisms and conduct an independent study of inheritance in *Drosophila*.

BIO S 282 Human Genetics
Spring. 2 or 3 credits (2 credits if taken after Biological Sciences 281). Each discussion limited to 25 students. Prerequisite: one year of introductory biology or equivalent; permission of instructor required for students who have taken Biological Sciences 281. S-U grades optional.

Lecs, M W 10:10 (lecs, also F 10:10 1st 3 weeks only); disc, R 10:10 or F 10:10 or 11:15. R. A. Calvo.

A course designed for nonmajors. Lectures provide the technical background needed to understand controversial personal, social, and legal implications of modern genetics that are discussed in section meetings.

BIO S 385 Developmental Biology
Fall. 3 credits. Prerequisite: Biological Sciences 281.

Lecs, M W F 11:15. K. J. Kemphues.

An introduction to the morphogenetic, cellular, and genetic aspects of the developmental biology of animals.

[BIO S 389 Embryology
Spring. 3 credits. Limited to seniors. Prerequisites: one year of introductory biology and a knowledge of mammalian adult anatomy. Not offered 1992–93.

Lecs, T R 10:10; labs, T R 2–4:25. A. W. Blackler.

A course in the embryonic development of vertebrate animals, with emphasis on the comparative aspects of morphogenesis and function at the tissue level. The laboratory has a strong morphogenetic bias, emphasizing the comparative aspects of developmental anatomy. Preserved materials are used in the laboratory.]

BIO S 480 Seminar in Developmental Biology
Spring. 1 credit. May be repeated for credit. Limited to upperclass students. S-U grades only.

Sem to be arranged. Staff.

BIO S 481 Population Genetics
Fall. 4 credits. Prerequisite: Biological Sciences 281 or equivalent.

Lecs, M W F 10:10; disc, M 2:30 or T 1:25. C. F. Aquadro.

A study of factors that influence the genetic structure of Mendelian populations and that are involved in race formation and speciation. Topics include the diversity and measurement of genetic variation, mating and reproductive systems, selection and fitness, genetic drift, migration and population structure, mutation, multilocus models, the genetics of speciation, quantitative traits, and the maintenance of molecular variation. The interplay between theory and the data from experiments and natural populations are emphasized. Consideration is also given to the population genetic issues involved in DNA fingerprinting,

BIO S 482 Human Genetics and Society
Fall. 3 credits. Enrollment limited to 30 senior biological sciences majors, with preference given to students studying genetics and development. Prerequisites: Biological Sciences 281 and 330 or 331. S-U grades optional.

Disc, T 2:30–4:25 and R 2:30–3:30 or 3:30–4:30. R. A. Calvo, H. T. Stinson.

Presentation of the technology and discussion of the ethical, social, and legal implications of recent advances in human genetics. Among the topics that may be considered are new reproductive strategies, eugenics, genetic counseling, genetic screening (prenatal, neonatal, presymptomatic, carrier, and workplace), wrongful life and wrongful birth, genetic effects of abused substances, genetics and behavior, and therapy for genetic diseases. Students lead most discussions. There is a major writing component in the course.

BIO S 483 Molecular Aspects of Development
Spring. 3 credits. Prerequisites: Biological Sciences 281, 330 or 331, and 385. Offered alternate years.

Lecs, T R 10:10–11:25. W. H. Mark.

An examination of the molecular biology of developing systems, with emphasis on the genomic, transcriptional, post-transcriptional, translational, and post-translational mechanisms involved in regulating development. Both prokaryotic and eukaryotic systems are considered, but emphasis is on the latter. Topics to be discussed include changes in chromatin structure, DNA rearrangements, control of RNA synthesis and processing, translational controls, nucleo-cytoplasmic interactions, and genetic responses to hormone treatment. The regulation of selected developmental systems is considered in detail.

[BIO S 484 Molecular Evolution
Spring. 3 credits. Prerequisites: Biological Sciences 281 and organic chemistry. Offered alternate years. Not offered 1992–93.

Lecs, T R 11:15. R. J. MacIntyre.

An analysis of evolutionary changes in proteins and nucleic acids. Theories on the evolution of the genetic code and the construction of phylogenetic trees from biochemical data are discussed. The second half of the course concerns the evolution and the organization of genomes from viruses to higher eukaryotes.]

BIO S 485 Microbial Genetics, Lectures
Fall. 2 credits. Limited to upperclass and graduate students. Prerequisites: Biological Sciences 281 and Microbiology 290, or written permission of instructor. S-U grades optional.

Lec, W 7:30–9:25 p.m. S. A. Zahler.

Genetics of bacteria and their viruses, with emphasis on the mechanisms of genetic phenomena. The first half of the course deals with the biosynthesis of proteins, RNA, and DNA by bacteria; how bacteria control those syntheses; the mechanisms of DNA repair and recombination; and types of mutations that occur. The second half of the course deals with more specific questions: transformation in various bacteria; plasmids and their roles in mating, genetic engineering, antibiotic resistance, and pathogenicity; and the molecular biology of selected bacteriophages (mainly T4, T7, M13, ΦX174, MS2, lambda, and Mu).

BIO S 487 Microbial Genetics, Laboratory
Fall. 3 credits. Primarily for upperclass students. Limited to 16 students. Prerequisites: concurrent or previous enrollment in Biological Sciences 485, 291 or equivalent, and written permission of instructor.

Lab, T 1:25–4:25; additional hours to be arranged. S. A. Zahler.

Problem solving in bacterial genetics.

BIO S 684 Advanced Topics in Population Genetics
Spring. 2 credits. Limited to 20 students. Prerequisites: Biological Sciences 481 or equivalent and written permission of instructor. S-U grades optional. Offered alternate years.

Lec, T 2:30–4:25. C. F. Aquadro.

An in-depth exploration of current areas of research in population genetics. Readings primarily from recent books and the current literature. Specific topics announced the previous fall and in the division's catalog supplement. Format includes lectures, discussion, and presentations by students.

[BIO S 686 Mammalian Development
Spring. 3 credits. Limited to 25 students. Prerequisites: Biological Sciences 281, 330 or 331, and 385, or their equivalents. S-U grades optional. Offered alternate years. Not offered 1992–93.

Lecs, T R 10:10–11:25. W. H. Mark.

An in-depth study of mammalian development using the mouse as the animal model. The course covers classical embryology beginning with gametogenesis followed by morphogenetic and biochemical analyses of pre- and post-implantation development. Current

topics in experimental embryology, including genetic analysis of mutants, study of cell lineage with chimeras, *in vitro* culturing of embryonic stem cells, and molecular approaches to understanding development are examined.]

[BIO S 687 Developmental Genetics
Fall. 2 credits. Limited to 20 students. Prerequisites: Biological Sciences 281 and 385 or their equivalents. S-U grades optional. Offered alternate years. Not offered 1992–93.
Lec to be arranged. K. J. Kemphues.
Selected topics focus on the use of genetic analysis in understanding mechanisms of development. Topics are drawn primarily from studies in *Drosophila*, *Caenorhabditis*, and mouse. Possible topics include pattern formation, cell lineage, neural development, maternal information in development, germ cell development, sex determination, and intercellular communication. Students read current literature and are given the opportunity to discuss each topic in class.]

BIO S 688 Yeast Genetics
Spring. 2 credits. Prerequisites: Biological Sciences 281, 330 or 331, and 485, or permission of instructor. S-U grades optional. Offered alternate years.
Lecs, T R 1:25. T. D. Fox.
An advanced overview of genetic studies in yeast, primarily *Saccharomyces cerevisiae*. Both formal genetic and molecular approaches to selected problems of biological interest are discussed.

BIO S 780 Current Topics in Genetics
Fall or spring. 2 credits. May be repeated for credit. Primarily for graduate students, with preference given to majors in the Field of Genetics; written permission of instructor required for undergraduates. Limited to 20 students. No auditors. S-U grades optional, with permission of instructor.
Sem to be arranged. Staff.
A seminar course with critical presentation and discussion by students of original research papers in a particular area of current interest. Content of the course and staff direction vary each year and are announced a semester in advance.

BIO S 781 Problems in Genetics and Development
Fall. 2 credits. Limited to first-year graduate students in the Field of Genetics and Development.
Disc to be arranged. Staff.
An introduction to the research literature in selected areas through weekly problem sets and discussions.

BIO S 782–783 Current Genetics/ Development Topics
Fall or spring. 1/2 or 1 credit for each topic. May be repeated for credit. S-U grades only.
Lectures and seminars on specialized topics to be announced.

BIO S 786 Research Seminar in Genetics and Development
Fall and spring. 1 credit. Required of second-, third-, and fourth-year graduate students in Genetics and Development. S–U grades only.
Sem, W 12:20–1:30. Staff.
Each graduate student presents one seminar per year based on his or her thesis research. The student then meets with the thesis committee members for an evaluation of the presentation.

BIO S 787 Seminar in Genetics and Development
Fall or spring. 1 credit. Limited to graduate students in Genetics and Development. S–U grades only.
Sem, M 4–5. Staff.
Seminars in current research in genetics and developmental biology conducted by distinguished visitors and staff.

Related Courses in Other Departments

Animal Cytogenetics (Animal Science 419)

Animal Development (Veterinary Anatomy 507)

Current Topics in Biochemistry (Biological Sciences 731–736)

Evolutionary Biology (Biological Sciences 378)

Immunogenetics (Animal Science 486)

Laboratory in Plant Molecular Biology (Biological Sciences 641)

Plant Growth and Development (Biological Sciences 644)

Plant Molecular Biology I (Biological Sciences 653)

Plant Molecular Biology II (Biological Sciences 652)

Reproduction and Development of Marine Invertebrates (Biological Sciences 488)

Undergraduate Research in Biology (Biological Sciences 499)

MICROBIOLOGY

BIO S 290 General Microbiology, Lectures
Fall, spring, or summer (6-week session). 3 credits. Prerequisites: Biological Sciences 101–102 and 103–104 and Chemistry 104 or 208, or equivalent. Recommended: concurrent registration in Biological Sciences 291.
Lecs, M W F 11:15. M. L. Cordts, S. M. Merkel.
A comprehensive overview of the biology of microorganisms, with emphasis on bacteria. The biology of eukaryotic microorganisms and viruses is also discussed briefly. Topics include microbial cell structure and function, physiology, metabolism, genetics, diversity, and ecology. Applied aspects of microbiology are also covered such as biotechnology, the role of microorganisms in environmental processes, and immunology and medical microbiology.

BIO S 291 General Microbiology, Laboratory
Fall or spring, 2 credits. Summer (6-week session), 2 or 3 credits. Prerequisite: concurrent or previous enrollment in Biological Sciences 290.
Labs, M W 2–4:25, or T R 11:15–1:45 or 2–4:25. C. M. Rehkugler.
A study of the basic principles and techniques of laboratory practice in microbiology, and fundamentals necessary for further work in the subject.

BIO S 292 General Microbiology, Discussion
Spring. 1 credit. Prerequisite: concurrent or previous enrollment in Biological Sciences 290.
S-U grades only.
Disc to be arranged. C. M. Rehkugler, E. Seacord.
A series of discussion groups in specialized areas of microbiology to complement Biological Sciences 290.

BIO S 300 Seminar in Microbiology
Spring. 1 credit. Required of biological science students in the microbiology program of study. Strongly recommended for students considering the microbiology program of study. S-U grades only.
Sem, W 12:20. Staff.
A series of lectures and seminars designed to present students with laboratory safety training and acquaint them with research projects in microbiology on the Cornell campus.

BIO S 304 Pathogenic Bacteriology and Mycology (also Veterinary Microbiology, Immunology, and Parasitology 318)
Spring. 2 or 4 credits (4 credits with lecture and laboratory). Limited to 40 students. Prerequisites: Biological Sciences 290 and 291. Strongly recommended: Biological Sciences 305 and 307. Offered alternate years.
Lecs, T R 1:25; labs, T R 2:25–5.
T. H. Kawula, L. E. Winter.
The study of the major bacterial and fungal agents of infectious disease, with emphasis on the function of virulence mechanisms and the host-parasite interaction. Lectures cover the significance of normal flora, antibiotic therapy and drug resistance, and vaccine development. Laboratories emphasize techniques for isolation, culture, and identification of infectious agents. Animal models are used to help understand certain pathogenic mechanisms.

[BIO S 308 Pathogenic Virology (also Veterinary Microbiology, Immunology, and Parasitology 317)
Spring. 4 credits. Limited to 40 students. Prerequisites: Biological Sciences 290 and 291. Recommended: Biological Sciences 305. Offered alternate years. Not offered 1992–93.
Lecs, T R 1:25; labs, T R 2:25–4:25. Evening prelims to be arranged.
J. W. Casey, L. E. Winter.
Properties of the virion, viral-host interactions, strategies for gene regulation, and mechanisms of pathogenicity are studied. Selected viral infections that result in immune disfunction and neoplasia are highlighted in the context of current approaches to prevent or reduce the severity of disease. Laboratories emphasize the isolation and culture of viral pathogens as well as demonstrations on tissue culture and animal models for studying the pathogenesis of, and the immune response to, infectious agents. Discussions are included in the laboratory and guest speakers present current approaches of identifying and characterizing viral agents.]

[BIO S 317 Tissue Culture Techniques and Applications
Fall. 2 credits. Prerequisites: Biological Sciences 290 and 291 or permission of instructor. Not offered 1992–93.
Lec, F 1:25–2:30; lab exercises with follow-up work done independently, F 2:30–4:30. C. M. Rehkugler.
A series of lectures and demonstrations dealing with cell culture methods, especially those required to culture cells of animals from different tissue origins. The application of cell culture to the study of bacterial diseases, virus replication, and the production of biologicals is considered.]

BIO S 391 Advanced Microbiology Laboratory
Fall. 3 credits. Prerequisites: Biological Sciences 290, 291, and 330 or 331. Preference given to biological sciences students in the microbiology program of study.
Lab, M W or T R 1:25–4:25; disc, F 1:25.
J. B. Russell and staff.
A laboratory course that illustrates basic principles of experimental microbiology. The course is organized into four modules which last three weeks each: 1) ecology, 2) physiology, 3) genetics, and 4) structure and function. Students select a topic from one of the modules and conduct a two-week independent experiment at the end of the semester.

BIO S 398 Environmental Microbiology (also Soil, Crop, and Atmospheric Sciences 398)
Spring. 3 credits. Prerequisite: Biological Sciences 261 or 290 or Soil, Crop, and Atmospheric Sciences 260 or permission of instructor. Offered alternate years.
Lecs, M W F 10:10. M. Alexander, W. C. Ghiorse.
Behavior and function of microorganisms in natural environments and the role of microorganisms in transformation of pollutants.

BIO S 406 Clinical Microbiology
Fall or spring. Credit to be arranged. Prerequisite: permission of instructor.
Hours to be arranged. R. P. Mortlock.
Training and practical experience in clinical microbiology in the hospital laboratory of the Cornell Medical College and New York Hospital in New York City. Emphasis is on developing students' capability in the isolation and rapid identification of organisms from various types of clinical specimens. This course is intended to prepare the student for state and federal licensing in various areas of clinical microbiology. This is a full-time program, taking place from September to August of the student's senior year.

BIO S 415 Bacterial Diversity, Lectures
Fall. 3 credits. Prerequisites: Biological Sciences 290, 291, and 330 or 331.
Lecs, M W F 11:15. S. H. Zinder.
A consideration of the physiology, ecology, genetics, and practical potential of important groups of bacteria. Topics include molecular methods for determining bacterial phylogeny and taxonomy, the evolution of diverse mechanisms of energy conservation, fixation of carbon and nitrogen, and adaptation to extreme environments.

BIO S 416 Microbial Physiology, Lectures
Spring. 3 credits. Prerequisites: Biological Sciences 290 and 291 or equivalent and biochemistry. Recommended: Biological Sciences 415. S-U grades optional for students not specializing in the microbiology program of study.
Lecs, M W F 11:15. R. P. Mortlock.
The concern is with the physiological and metabolic functions of microorganisms. Consideration is given to chemical structure, regulation, growth, and the energy metabolism of prokaryotic organisms. Special attention given to those aspects of microbial metabolism and carbohydrate catabolism not normally studied closely in biochemistry courses.

BIO S 451 Structure and Function of Bacterial Cells
Fall. 3 credits. Prerequisites: Biological Sciences 290 and 330 or 331 or permission of instructor. Recommended: Biological Sciences 415. S-U grades optional. Offered alternate years.
Lecs, M W F 10:10. W. C. Ghiorse.
Morphology, ultrastructure, macromolecular organization, and life cycles of bacterial cells are considered with regard to chemical composition and physiological and ecological function of cellular components.

BIO S 652 (Section 04) Molecular Plant-Microbe Interactions
Spring. 1 credit. Prerequisites: Biological Sciences 281, 330 or 331, and 653 (section 01) or their equivalents. S-U grades optional.
Lecs, M W F 10:10 (12 lecs) Mar. 31–Apr. 26. S. C. Winans, T. A. LaRue.
Course focuses on the interactions of *Agrobacteria* and *Rhizobia* with plants. Topics on *Agrobacterium*-plant interactions include plant-microbe recognition mechanisms, T-DNA transfer process, oncogenesis, and use of *Agrobacterium* to produce transgenic plants. Topics on *Rhizobium*-plant interactions include regulation of nitrogenase activity and expression, organization and function of the *sym* plasmid, nodule development, and plant genetics involved in plant-microbe interaction.

BIO S 692 Protein-Nucleic Acid Interactions
Spring. 3 credits. Prerequisites: Biological Sciences 330 or 331 and 633.
Lecs, T R 10:10–11:25. J. D. Helmann.
The physical and chemical bases of protein-nucleic acid interactions are explored including both theory and specific examples. Proteins considered include: bacterial non-specific and sequence specific DNA and RNA binding proteins, nucleic acid polymerases, recombinases, topoisomerases, DNA repair enzymes, and nucleases.

BIO S 694 Genetic Aspects of Bacterial Diversity
Spring. 3 credits. Prerequisite: Biological Sciences 485 or equivalent.
Lecs, M W 2:30–3:45. S. C. Winans.
Selected topics in bacterial diversity, with strong emphasis placed on underlying molecular mechanisms. Topics include interactions between bacteria and plants and animals, prokaryotic developmental biology, biodegradation of xenobiotics, and synthesis of antibiotics.

[BIO S 695 Bacterial Genetics
Fall. 3 credits. Prerequisites: Biological Sciences 485 and 633 or permission of instructor. Not offered 1992–93.
Lecs, T R 10:10–11:25. V. J. Stewart.
Current themes in bacterial genetics are considered in detail through examination of the primary literature. Topics include: recombination and genetic exchange; transposons; mutagenesis and DNA repair; and pathway-specific and global regulation of gene expression. Emphasis is on coordinated studies that derive complementary information from both *in vivo* and *in vitro* techniques.]

BIO S 795–796 Current Topics in Microbiology
Fall, 795; spring, 796. 1/2 or 1 credit for each topic. May be repeated for credit. Designed primarily for graduate students in microbiology. Prerequisite: upper-level courses in microbiology. S-U grades only.
Lecs to be arranged. Staff.
Lectures and seminars on special topics in microbiology.

BIO S 797 Graduate Seminar in Microbiology
Fall and spring. 1 credit each semester. All students in the Graduate Field of Microbiology must enroll for at least their first three semesters in residence. Students are expected to lead discussions on recent primary literature in microbiology. S-U grades only.
Sem to be arranged. Staff.

BIO S 798 Graduate Research Seminar in Microbiology
Fall and spring. 1 credit each semester. Required of all graduate students in the Graduate Field of Microbiology. S-U grades only.
Sem to be arranged. Staff.
A seminar relating to the research activities of those enrolled. Students who have completed the Biological Sciences 797 series requirement are required to present a seminar concerning their research interests and activities at least once each year.

BIO S 799 Microbiology Seminar
Fall and spring. Required of all graduate students in the Graduate Field of Microbiology and open to all who are interested.
Sem to be arranged. Staff.

Related Courses in Other Departments

Advanced Animal Virology, Lectures (Veterinary Microbiology, Immunology, and Parasitology 708)

Advanced Food Microbiology (Food Science 607)

Advanced Immunology Lectures (Biological Sciences 705 and Veterinary Microbiology, Immunology, and Parasitology 705)

Advanced Soil Microbiology (Soil, Crop, and Atmospheric Sciences 666)

Advanced Work in Bacteriology, Virology, or Immunology (Veterinary Microbiology, Immunology, and Parasitology 707)

Algal Physiology (Biological Sciences 346)

Bacterial Plant Diseases (Plant Pathology 647)

Basic Immunology, Lectures (Biological Sciences 305 and Veterinary Microbiology, Immunology, and Parasitology 315)

Bioprocessing Applications in Agriculture (Agricultural and Biological Engineering 467)

Ciliophorology (Biological Sciences 409)

Comparative Biogeochemistry (Biological Sciences 668)

Controlled Cultivation of Microbial Cells (Chemical Engineering 646)

Ecology of Soil-Borne Pathogens (Plant Pathology 644)

Food Microbiology, Laboratory (Food Science 395)

Food Microbiology, Lectures (Food Science 394)

Food Mycology (Food Science 411)

Immunology of Infectious Diseases and Tumors (Biological Sciences 706 and Veterinary Microbiology, Immunology, and Parasitology 719)

Insect Pathology (Entomology 453)

Intermediate Soil Science: Chemistry and Microbiology (Soil, Crop, and Atmospheric Sciences 364)

Introduction to Bioprocess Engineering (Chemical Engineering 643)

Introduction to Scanning Electron Microscopy (Biological Sciences 401)

Introductory Mycology (Plant Pathology 309)

Limnology: Ecology Lakes, Lectures (Biological Sciences 457)

Magical Mushrooms, Mischievous Molds (Plant Pathology 201)

Marine Microbial and Plankton Ecology (Biological Sciences 454)

Marine Plankton Ecology (Biological Sciences 468)

Microbial Genetics, Laboratory (Biological Sciences 487)

Microbial Genetics, Lectures (Biological Sciences 485)

Microbiology of the Rumen (Animal Science 607)

Microbiology of Water and Wastewater (Civil and Environmental Engineering 651)

Optical Methods of Biologists (Biological Sciences 450)

Plant Virology (Plant Pathology 645)

NEUROBIOLOGY AND BEHAVIOR

BIO S 221 Neurobiology and Behavior I: Introduction to Behavior
Fall. 3 or 4 credits (4 credits with discussion and written projects). 4–credit option required of students studying neurobiology and behavior. Each discussion limited to 20 students, with preference given to students studying neurobiology and behavior. Not open to freshmen. Prerequisite: one year of introductory biology for majors. May be taken independently of Biological Sciences 222. S-U grades optional.
Lecs, M W F 12:20; disc to be arranged. C. Walcott and staff.
A general introduction to the field of behavior. Topics include evolution and behavior, behavioral ecology, sociobiology, chemical ecology, communication, neuroethology, rhythmicity, orientation and navigation, and hormonal mechanisms of behavior.

BIO S 222 Neurobiology and Behavior II: Introduction to Neurobiology
Spring. 3 or 4 credits (4 credits with discussion and written projects). 4–credit option required of students studying neurobiology and behavior. Each discussion limited to 20 students, with preference given to students studying neurobiology and behavior. Not open to freshmen. Prerequisites: one year of introductory biology for majors and one year of chemistry. May be taken independently of Biological Sciences 221. S-U grades optional.
Lecs, M W F 12:20; disc to be arranged. R. M. Harris-Warrick and staff.
A general introduction to the field of cellular and integrative neurobiology. Topics include neural systems, neuroanatomy, developmental neurobiology, electrical properties of nerve cells, synaptic mechanisms, neurochemistry, motor systems, sensory systems, learning, and memory.

BIO S 322 Hormones and Behavior (also Psychology 322)
Spring. 3 or 4 credits; the 4-credit option involves a one-hour section once a week, in which students are expected to participate in discussion and read original papers in the field. Limited to juniors and seniors; open to sophomores only by permission. Prerequisites: one year of introductory biology plus a course in psychology or Biological Sciences 221 or 222. S-U grades optional.
Lecs, T R 10:10–11:30; disc to be arranged. Staff.
The relationship between endocrine and neuroendocrine systems and the behavior of animals, including humans. Major emphasis is on sexual, parental, and aggressive behavior.

BIO S 324 Biopsychology Laboratory (also Psychology 324)
Fall. 4 credits. Limited to 20 upperclass students. Prerequisites: laboratory experience in biology or psychology, Biological Sciences 221 and 222 or Psychology 123 and 222; and permission of instructor.
Labs, T R 1:25–4:25. T. J. DeVoogd.
Experiments designed to provide research experience in animal behavior (including learning) and its neural and hormonal mechanisms. A variety of techniques, species, and behavior patterns are included. Live animals are used in the laboratory.

[BIO S 326 The Visual System
Spring. 4 credits. Prerequisites: Biological Sciences 222 or 311, or permission of instructor. S-U grades optional. Offered alternate years. Not offered 1992–93.
Lecs, M W F 10:10; disc, 1 hour each week to be arranged. H. C. Howland.
The visual systems of vertebrates and invertebrates are discussed in breadth and depth. Topics covered include the optics of eyes, retinal neurophysiology, structure and function of higher visual centers, and ocular development.]

BIO S 328 Biopsychology of Learning and Memory (also Psychology 332)
Spring. 3 credits. Prerequisites: one year of biology and either a course in biopsychology or Biological Sciences 222.
Lecs, M W F 11:15. T. J. DeVoogd.
This course surveys the approaches that have been or are currently being used to understand the biological bases for learning and memory. Topics include invertebrate, "simple system" approaches, imprinting, avian song learning, hippocampal and cerebellar function, and human pathology. Many of the readings are from primary literature.

[BIO S 396 Introduction to Sensory Systems (also Psychology 396)
Spring. 3 or 4 credits (4 credits with term paper). Registration for the 4-credit option requires permission of instructor. No auditors. Prerequisites: an introductory course in biology or biopsychology, and a second course in neurobiology or behavior or perception or cognition or biopsychology; students are expected to have elementary knowledge of perception, neurophysiology, behavior, and chemistry. Offered alternate years. Not offered 1992–93.
Lecs, M W F 9:05. B. P. Halpern.
This course employs the Socratic method, in which the instructor asks questions of the students. Students read, analyze, and discuss in class difficult original literature dealing with both those characteristics of sensory systems that are common across living organisms and those sensory properties which represent adaptations of animals to particular habitats or environments. The principles and limitations of major methods used to examine sensory systems are considered. General principles of sensory systems and auditory, visual, and somesthetic systems are covered. One aspect of each system (e.g., localization of objects in space by sound, color vision, and thermoreception) is selected for special attention. At the level of *An Introduction to the Physiology of Hearing*, by J. O. Pickles; *Physiological acoustics, neural coding, and psychoacoustics*, by W. L. Gulick, G. A. Gescheider, and R. D. Frisina; *The Retina: An approachable part of the brain*, by J. E. Dowling; *Handbook of Physiology—The Nervous System. III. Sensory Processes*, edited by J. M. Brookhard and V. B. Mountcastle.]

BIO S 420 Topics in Neurobiology and Behavior
Fall or spring. Variable credit. May be repeated for credit. Primarily for undergraduates. S-U grades optional.
To be arranged. Staff.
Courses on selected topics in neurobiology and behavior; can include lecture and seminar courses. Topics, instructors, and time of organizational meetings are listed in the division's catalog supplement issued at the beginning of the semester.

[BIO S 422 Computer Interfacing for Neurobiologists
Spring. 3 credits. Limited to 20 students. Prerequisites: Biological Sciences 222 and 426, or permission of instructor. S-U grades optional. Offered alternate years. Not offered 1992–93.
Lecs, T R 9:05; lab, 4 hours each week to be arranged. D. W. McBride.
Lectures and laboratories deal with interfacing a computer with an experiment and doing data acquisition and computer control of the experiment. Topics include introduction to digital electronics, data acquisition and monitoring of an experiment (A/D conversions and digital input), some data analysis and decision making, computer control of an experiment (D/A conversions and digital output), communication (RS-232 and IEEE), sampling theory and Fourier analysis and feedback control using computers. A Mac II computer is used in this course.]

[BIO S 424 Neuroethology
Fall. 3 credits. Prerequisites: Biological Sciences 221 and 222. S-U grades optional for graduate students only. Offered alternate years. Not offered 1992–93.
Lecs, M W F 11:15; occasional disc to be arranged. C. D. Hopkins.
The integrated study of neurobiology and animal behavior. Representative topics include acoustic communication in insects and amphibians, vocal mechanisms and plasticity of bird song, mammalian hearing, bat echolocation, prey detection by owls, electroproduction and electroreception in fish, neurophysiology and behavior of pheromone communication, neurobehavior of vision in anurans, mammalian visual processing, command neurons and decision networks, locomotion and motor-pattern generation, escape behavior in invertebrates, and neural correlates of learning. Assigned readings include original articles in the scientific literature. A term paper on the neural basis of animal behavior is required.]

BIO S 426 Electronics for Neurobiology
Spring. 3 credits. Limited to 20 students. Prerequisites: Biological Sciences 222 and one year of introductory physics. Offered alternate years.

Lecs, T R 9:05; lab, 4 hours each week to be arranged. D. W. McBride.

The course deals with electronics as applied to neurobiology and behavior. Analog circuits centered around operational amplifiers are emphasized. Topics include a review of basic electrical concepts; the cell as circuit, voltage, and current amplifiers; transducers (temperature, light, pressure, etc.); filtering; timing circuits; radiotelemetry; basic trouble shooting; and reading schematics. In the last third of the term, students design and construct a circuit (both circuit board and housing box) of their own choosing relative to their research and/or interests.

BIO S 427 Animal Social Behavior
Fall. 4 credits. Limited to 30 students. Prerequisites: Biological Sciences 221 and 261 or 378 and permission of instructor. S-U grades optional, with permission of instructor. Offered alternate years.

Lecs and discs, M W 2:30–4:25. S. T. Emlen.

An intensive course for upper-division students interested in the adaptive bases of social behavior. Lectures, discussions, and student presentations examine topics including spacing systems, mating systems, sexual selection, mate choice, conflict and cooperation in animal societies, and the evolution of deceit, honesty, and altruism.

[BIO S 428 Topics in Behavior
Fall or spring. 2–4 credits. (Credits based on number of lectures and/or field exercises as outlined in the division's catalog course supplement and subject to approval through the associate director's office.) May be repeated for credit. Primarily for undergraduates. S-U grades optional. Not offered 1992–93.

Sem to be arranged. Staff.

Courses on selected topics in behavior; can include lecture and seminar courses; may include laboratory. Past topics have included animal orientation, insect behavior, biorhythms, and communication. Topics, instructors, and time of organizational meeting are listed in the division's catalog supplement issued at the beginning of each semester.]

[BIO S 429 Olfaction and Taste: Structure and Function (also Psychology 429)
Fall. 3 or 4 credits (4 credits with term paper or research project, which can, but need not, study nonhuman vertebrates). Preference given to junior and senior psychology and biology majors and graduate students. Graduate students, see Psychology 629. Prerequisite: a 300–level course in biopsychology or equivalent. S-U grades optional for graduate students only. Offered alternate years. Not offered 1992–93.

Lecs, T R 9:05. B. P. Halpern.

The structural and functional characteristics of olfaction and taste are explored by reading and discussing current literature in these areas. Structure is examined at the light levels of electron microscopes, as well as at the molecular level. Function is examined primarily in its neurophysiological and biochemical aspects. The emphasis is on vertebrates, especially air-breathing vertebrates in the case of olfaction, although there is some coverage of invertebrate forms. At the level of *Smell and Taste in Health and Disease*, edited by T. V. Getchell, R. L. Doty, L. M. Bartoshuk, and J. B. Snow; *The Neurobiology of Taste and Smell*, edited by T. E. Finger and W. L. Silver.]

BIO S 491 Principles of Neurophysiology
Fall. 4 credits. Limited to 20 students. Prerequisite: Biological Sciences 222 or written permission of instructor. S-U grades optional for graduate students.

Lecs, M W 10:10; lab, M or W 12:20–4:25; additional hours to be arranged. B. R. Johnson.

A laboratory-oriented course designed to teach the theory and techniques of modern cellular neurophysiology. Lecture time is used to present laboratory exercise results, to supplement laboratory topics, and for discussion of primary research papers. Intracellular and extracellular recording techniques are used to analyze neuronal properties such as resting potentials, electrical and chemical synaptic transmission, ionic currents under voltage-clamp, and functional expression of foreign membrane proteins in *Xenopus oocytes*. A variety of preparations, both invertebrate and vertebrate, are used as model systems. Computer acquisition and analysis of laboratory results are emphasized.

BIO S 492 Sensory Function (also Psychology 492)
Spring. 4 credits. Prerequisite: 300-level course in biopsychology or Biological Sciences 222 or 311, or permission of instructors. Students are expected to have a knowledge of elementary physics, chemistry, and behavior. S-U grades optional. Offered alternate years.

Lecs, M W F 10:10; sec, hours to be arranged. H. C. Howland, B. P. Halpern.

This course covers classical topics in sensory function such as vision, hearing, touch, and balance, as well as some more modern topics like sensory coding, location of stimulus sources in space, and the development of sensory systems. Both human and nonhuman systems are discussed. In all cases the chemical, physical, and neurophysiological bases of sensory information are treated, and the processing of this information is followed into the central nervous system. At the level of *The Senses*, edited by Barlow and Mollon, and *An Introduction to the Physiology of Hearing, 2nd edition*, by Pickles.

BIO S 493 Developmental Neurobiology
Fall. 3 credits. Prerequisite: Biological Sciences 222 or permission of instructor. S-U grades optional, with permission of instructor. Offered alternate years.

Lecs, M W F 9:05. R. Booker.

Lectures covering the development of the nervous system, taking examples from both vertebrates and invertebrates. Emphasis is on cellular and molecular issues, that is, How do nerve cells differentiate both morphologically and biochemically? The role of cues such as hormones and developmental genes in neural development are discussed. Readings are taken from original journal articles.

BIO S 494 Comparative Vertebrate Neuroanatomy
Spring. 3 credits. Intended for juniors, seniors, and graduate students. Prerequisite: Biological Sciences 222 or equivalent. S-U grades optional. Offered alternate years.

Lecs, T R 10:10–11:30. A. H. Bass.

Organization and evolution of neuroanatomical pathways as substrates for species-typical vertebrate behaviors. The course is divided into three major sections: development, general principles of brain organization, and vertebrate brain evolution.

BIO S 495 Membrane Ion Channels
Spring. 3 credits. Limited to 15 students. Prerequisites: Biological Sciences 222, college introductory physics, and calculus, or permission of instructor. S-U grades optional. Offered alternate years.

Lecs, M W F 10:10. O. P. Hamill.

The functional and mechanistic aspects of membrane ion channels, beginning with basic concepts and model systems. Theories of ion permeation and channel gating are discussed. Development of membrane ion channels during neuron differentiation and the role of membrane channels in disease states are also considered.

BIO S 496 Bioacoustic Signals in Animals and Man
Spring. 3 credits. Limited to 12 junior, senior, and graduate students. Prerequisites: one year of introductory biology, Physics 101–102 or 207–208, and permission of instructor. S-U grades optional. Offered alternate years.

Lecs, M W 9:05; lab to be arranged. C. Clark, R. R. Hoy.

Humans and most terrestrial animals live in a world of sound. Acoustic signals mediate social interactions and predator-prey behavior. This course teaches students about animal acoustical communication by introducing them to the different communication systems that are based on sound. The course presents the physical properties of sound, the physiological mechanisms of sound production and hearing, and an analysis of the behavioral context of signaling. In the laboratory students learn how to record, synthesize, and analyze acoustic signals with the aid of tape recorders and the Macintosh computer. Laboratories are designed around the lecture material and provide "real-world" exercises designed to stimulate discovery of the fundamental principles described in class. Class research projects on a selected topic in bioacoustics are required. The laboratory is based on software instrumentation running on a Macintosh II platform equipped with A/D-D/A data acquisition boards.

BIO S 497 Neurochemistry and Molecular Neurobiology
Fall. 3 credits. Limited to 30 students. Prerequisites: Biological Sciences 222 and either 330 or 331, or permission of instructor. S-U grades optional. Offered alternate years.

Lecs, T R 9:05; disc, T 10:10. R. M. Harris-Warrick.

This course focuses primarily on synaptic neurochemistry. The presynaptic regulation of release and postsynaptic mechanism of action of the major classes of neurotransmitters are discussed, as well as selected neuromodulators and hormones. Second-messenger mechanisms are stressed. Readings are primarily from journal articles.

[BIO S 623 Chemical Communication (also Chemistry 622)
Fall. 3 credits. Primarily for research-oriented students. Limited to 30 students. Prerequisites: one year of introductory biology for majors or equivalent, course work in biochemistry, and Chemistry 358 or equivalent. Offered alternate years. Not offered 1992–93.

Lecs, M W F 1:25. T. Eisner, J. Meinwald, W. L. Roelofs, and guest speakers.
The production, transmission, and reception of chemical signals in communicative interactions of animals, plants, and microorganisms. Studies of insects are emphasized. Specific topics are treated with varying emphasis on chemical, biochemical, ecological, behavioral, and evolutionary principles.]

BIO S 626 Sex Differences in Brain and Behavior (also Psychology 524)
Spring. 2 credits. Limited to 12 students. Prerequisite: Biological Sciences 322 or permission of instructor.
Discs and sems, M W 3:35–5:30. T. J. DeVoogd.
A survey of the newly discovered animal models for sex differences in the brain. Topics include the role of steroids in brain development, whether hormones can modify the structure of the adult brain, and the consequences of such sex differences in anatomy for behavior.

BIO S 720 Seminar in Advanced Topics in Neurobiology and Behavior
Fall or spring. Variable credit. May be repeated for credit. Primarily for graduate students; written permission of instructor required for undergraduates. S-U grades optional.
Sem to be arranged. Staff and students.
Designed to provide several study groups each semester on specialized topics. A group may meet for whatever period is judged adequate to enable coverage of the selected topics. Ordinarily, topics are selected and circulated during the preceding semester. Discussion of current literature is encouraged. Suggestions for topics should be submitted by faculty or students to the chair of the Section of Neurobiology and Behavior.

BIO S 721 Introductory Graduate Survey in Neurobiology and Behavior
Fall and spring. 2 credits each term. (Students must register for 4 credits each term, since an "R" grade is given at the end of the fall term.) Required of graduate students majoring in neurobiology and behavior. Concurrent registration in Biological Sciences 221 and 222 not required. S-U grades only.
Lecs and discs, T R 10:10–12:05, alternate weeks. Staff.
Lectures by faculty and student-led discussions on topics of current importance in neurobiology and behavior. Topics are linked to the materials presented in Biological Sciences 221 and 222. Class meets twice a week, every other week. Students are required to write four term papers, over the two semesters, on selected topics in two of three sub-areas: (1) cellular and molecular neurobiology; (2) integrative neurobiology; (3) behavior.

BIO S 723 Advanced Topics in Animal Behavior
Fall or spring. Variable credit. May be repeated for credit. Primarily for graduate students in behavior. Prerequisite: permission of instructor. S-U grades optional.
Sem to be arranged. Staff.
A seminar on a specific topic in animal behavior. The instructor presents lectures during the first few course meetings; the remainder of the course is devoted to student presentations. Topic and instructor are listed in the division's catalog supplement issued at the beginning of the semester.

BIO S 724 Field Methods in Animal Behavior
Fall or spring. Variable credit. May be repeated for credit. Primarily for graduate students in behavior. Prerequisite: permission of instructor. S-U grades optional.
Sem and fieldwork to be arranged. Staff.
A seminar-field experience course designed for first-year graduate students in animal behavior. Weekly seminars discussing field methodology, data collection, and hypothesis testing are followed by an intensive period (ten days to two weeks) in the field. Specific topics and field sites vary from semester to semester. Topic and instructor are listed in the division's catalog supplement issued at the beginning of the semester.

BIO S 790 Advanced Topics in Cellular and Molecular Neurobiology
Fall or spring. Variable credit. May be repeated for credit. Limited to graduate students and advanced undergraduates studying neurobiology and behavior. Prerequisite: Biological Sciences 222. S-U grades optional.
Lecs and sem to be arranged. Staff.
A lecture-seminar course on selected topics in cellular and molecular neurobiology. Students read original papers in the scientific literature and lead discussions of these articles. Suggestions for topics may be submitted by faculty or students to the chair of the Section of Neurobiology and Behavior. Topic and instructor are listed in the division's catalog supplement issued at the beginning of the semester.

BIO S 792 Advanced Laboratory in Cellular and Molecular Neurobiology
Fall or spring. 2 credits. May be repeated for credit. Primarily for graduate students. Prerequisites: Biological Sciences 330 or 331 or equivalent, 491 or equivalent, and written permission of instructor. S-U grades optional.
Lab to be arranged. Staff.
A two-week intensive laboratory course designed to provide experience with a specific technique currently used in cellular and molecular neurobiology. The technique under study and instructor in charge vary from semester to semester and are listed in the division's catalog supplement issued at the beginning of the semester.

BIO S 793 Advanced Topics in Integrative Neurobiology
Fall or spring. Variable credit. May be repeated for credit. Primarily for graduate students; written permission of instructor required for undergraduates. S-U grades optional.
Lecs and discs to be arranged. Staff.
A course designed to provide in-depth knowledge of current research in anatomical and physiological bases of vertebrate and invertebrate behavior. Readings are primarily from specialty books and selected journal articles. Topic and instructor are listed in the division's catalog supplement issued at the beginning of the semester.

BIO S 794 Advanced Laboratory Techniques in Integrative Neurobiology
Fall or spring. Variable credit. May be repeated for credit. Prerequisite: permission of instructor based upon a personal interview.
Lab to be arranged. Staff.
A laboratory in the integrative, or neuroethological, approach to studies of animal behavior. Designed to provide practical working knowledge of research methods in anatomical, physiological, and behavioral approaches to studies of vertebrate and invertebrate behavior. Laboratory technique to be covered and instructor are listed in the division's catalog supplement issued at the beginning of the semester.

Related Courses in Other Departments

Animal Behavior (Psychology 535)

Biochemistry and Human Behavior (Psychology 361 and Nutritional Sciences 361)

Brain and Behavior (Psychology 425)

Developmental Biopsychology (Psychology 422)

Evolution of Human Behavior (Psychology 326)

Human Behavior: A Sociobiological Perspective (Anthropology 476)

Insect Behavior Seminar (Entomology 662)

Primates and Evolution (Anthropology 490)

Primate Behavior and Ecology (Anthropology 390)

Teaching Experience (Biological Sciences 498)

Undergraduate Research in Biology (Biological Sciences 499)

COURSES IN MARINE SCIENCE

Cornell offers an extensive listing of undergraduate courses in marine science.

Undergraduates interested in pursuing studies in marine science are encouraged to explore the undergraduate specialization in Marine Biology and Oceanography offered through the Division of Biological Sciences and the summer program of courses offered by the Shoals Marine Laboratory. Further information on both can be found at the Cornell Marine Programs Office, G14 Stimson Hall.

Undergraduate Specialization in Marine Biology and Oceanography

Biological Sciences majors in the ecology and evolutionary miology program of study have the option of specializing their program of study in the areas of marine biology and oceanography. In addition to fulfilling the major and the ecology and evolutionary biology program of study requirements, students in marine biology and oceanography are encouraged to enroll in the following courses:

1) Bio S 154, The Sea: An Introduction to Oceanography,
2) Bio S 364, Field Marine Science or a 400-level Bio S field course at the Shoals Marine Laboratory,
3) Bio S 462, Marine Ecology.

Students in this specialization are exposed to an integrated program of study, emphasizing a natural progression of formal course work combined with ample opportunities for practical field experience.

SHOALS MARINE LABORATORY

John B. Heiser, director
G14 Stimson Hall, 255-3717

The objective of the Shoals Marine laboratory (SML) is to provide undergraduates, beginning graduate students, and other interested adults a unique opportunity to explore marine sciences in an island setting noted for its biota, geology, and history. SML has established a national reputation for excellence and has become North America's largest marine field station focusing on undergraduate education.

The summer population of Appledore Island is limited to about one hundred people at any one time. Participants and faculty members can literally and figuratively immerse themselves in their explorations, free from distractions common to most academic institutions. Because SML is a residential facility, a sense of community develops that makes courses and seminars at SML oustanding educational and intellectual experiences. Participants learn from and exchange ideas with a wide range of specialists whose primary interests are marine but whose perspectives often differ, providing fertile ground for lively discussions.

Credit courses at Shoals Marine Laboratory are full-time, intensive learning experiences. Courses may be taken sequentially, but not concurrently. A typical day combines lecture sessions, laboratory and field work, field trips to nearby islands and the mainland, and collecting and research excursions aboard the laboratory's 47-foot research vessel, *John M. Kingsbury*. Field experience is an integral component of all courses, using Appledore's extensive intertidal zone, wading bird rookeries, and seabird colonies. Faculty, drawn from Cornell University, the University of New Hampshire, and other leading academic institutions, are selected not only based on their academic excellence, but also on their teaching ability in the field. In addition, numerous guest lecturers include engineers, coastal planners, lobstermen, fishermen, and specialists from private industry, government, and the academic community.

The Ithaca campus functions of the Shoals Marine Laboratory are centered in the Cornell Marine Programs Office, G14 Stimson Hall. The office serves as an advising center for students interested in the marine sciences, maintains a browsing library with updated information on graduate study and career opportunities as well as on marine programs at other institutions, and administers the SEA Semester, a 17-credit program offered in cooperation with the Sea Education Association.

The following marine sciences courses are currently administered by the Cornell Marine Programs Office.

BIO S 160 The Oceanography of the Gulf of Maine
Summer. 4 credits. S–U grades optional. Limited to 24 students. A special 3-week course offered aboard the *SSV Corwith Cramer* and at Cornell's Shoals Marine Laboratory (SML) on an island off Portsmouth, N.H. For more details and an application, consult the SML office, G14 Stimson Hall or the Sea Education Association office at P.O. Box 6, Woods Hole, MA 02543. Estimated cost (includes tuition, room and board aboard ship and on the island, and ferry transportation), $1,870.

Daily lecs, labs, and fieldwork for 3 weeks. SML faculty.

An exciting opportunity to explore the offshore and near-coastal environments of the Gulf of Maine for pre-college and first-year non-science majors. Students spend ten days aboard the Sea Education Association's *SSV Corwith Cramer* and sail from Woods Hole, Mass., to the Isles of Shoals via Georges Bank and the Gulf of Maine. Besides operating the ship, students study the many characteristics of this unique ocean environment. Following the sea component, students spend seven days at the Shoals Marine Laboratory to collect data characteristic of the Isles of Shoals coastal environment.

BIO S 161 Introduction to Field Marine Science
Summer. 4 credits. S-U grades optional. A special 2-week course offered at Cornell's Shoals Marine Laboratory (SML) on an island off Portsmouth, N.H. For more details and an application, consult the SML office, G14 Stimson Hall. Estimated cost (includes tuition, room and board, and ferry transportation), $1,395.

Daily lecs, labs, and fieldwork for 2 weeks. SML faculty.

This course allows students who are not biology majors to experience the breadth of the marine sciences under field conditions at an island laboratory. Aspects of biology, geology, earth science, chemistry, and physics are included. Specific topics include beach, salt marsh, tidal mud flat, tide pool, and benthic offshore environments; identification of marine plants and animals; chemical and physical oceanography; marine geology; and ecology of kelp beds and urchin barrens.

BIO S 204 Biological Illustration
Summer. 2 credits. A special 1-week course offered at Cornell's Shoals Marine Laboratory (SML) on an island off Portsmouth, N.H. For more details and an application, consult the SML office, G14 Stimson Hall. Estimated cost (includes tuition, room and board, supplies, and ferry transportation), $775.

Daily sessions for 1 week. SML faculty.

General discussion of scientific publishing, illustration labeling, color techniques, and printing processes. The course provides the scientist or science student a chance to experience several illustration techniques with the goal of obtaining an overview of scientific and wildlife illustrations. The student may choose a single technique to explore in depth. Course size is limited so that individual attention can be emphasized.

BIO S 309 Coastal Ecology and Bioclimates
Summer. 4 credits. Prerequisite: one year of college level biology; background preferred in physics/physical geography. S-U grades optional. A special 2-week course offered at Cornell's Shoals Marine Laboratory (SML) on an island off Portsmouth, N.H. For more details and an application consult the SML office, G14 Stimson Hall. Estimated cost (includes tuition, room and board, and ferry transportation), $1,350.

Daily lecs, labs, and fieldwork for 2 weeks. SML faculty.

A study of the fundamentals of organism-environment interaction developed through defining and measuring abiotic factors including solar radiation, temperature, atmospheric moisture, precipital wind, and currents. In-site exploration of the dynamics of meteorology and the role of abiotic and biotic factors in the life of coastal and marine plants and animals including humans.

BIO S 327 Neurobiology of Animal Behavior
Summer. 4 credits. Prerequisite: successful performance in college-level introductory biology and chemistry courses with laboratories. Recommended: course work in neurobiology, psychology, and animal behavior. S–U grades optional. A special 2-week course offered at Cornell's Shoals Marine Laboratory (SML) on an island off the coast of Portsmouth, N.H. For more details and an application, consult the SML office, G14 Stimson Hall. Estimated cost (includes tuition, room and board, and ferry transportation), $1,350.

Daily lecs, labs, and fieldwork for 2 weeks. SML faculty.

Neural mechanisms underlie all behaviors, from simple reflexes to complex social interactions. The functional elements of those mechanisms often are common to both vertebrate and invertebrate nervous systems. The course focuses on neural mechanisms of behavior in marine organisms, a topic that has produced significant biomedical discoveries. Students gain hands-on experience with a spectrum of modern research techniques for behavioral, systems, cellular, and molecular approaches. A visiting scientist program allows student interaction with research scientists.

BIO S 329 Ecology of Animal Behavior
Summer. 4 credits. Prerequisite: one year of introductory college biology. Recommended: course work in ecology, psychology, or behavior. S-U grades optional. A special 2-week course offered at Cornell's Shoals Marine Laboratory (SML) on an island off Portsmouth, N.H. For more details and an application, consult the SML office, G14 Stimson Hall. Estimated cost (includes tuition, room and board, and ferry transportation), $1,350.

Daily lecs and fieldwork for 2 weeks. SML faculty.

The ecological significance of behaviors of coastal organisms, with emphasis on field and laboratory research methods. Lectures and readings address the major subareas of behavior (communication, orientation, social behavior, foraging, predator avoidance, and sensory mechanisms). Each student engages in short-term behavioral observation and prepares a research proposal for studying a problem within the course subject area.

BIO S 363 Marine Biology for Teachers
Summer. 3 credits. Primarily for teachers, grades 6 through 12, but open to others with teaching experience. Prerequisite: one year of introductory college biology. S-U grades optional. A special 10-day course offered at Cornell's Shoals Marine Laboratory (SML), on an island off Portsmouth, N.H. For more details and an application, consult the SML office, G14 Stimson Hall. Estimated cost (includes tuition, room and board, and ferry transportation), $975.

Daily lecs, labs, and fieldwork for 10 days. SML faculty.

Designed to give an overview of living marine organisms (algae, invertebrates, fishes, marine mammals, and shorebirds) and of the environment they inhabit. Fieldwork is emphasized. Occasional lectures and films

deal with additional topics such as coastal-zone problems, marine fisheries, economics of marine organisms, and educational resources of the marine environment.

BIO S 364 Field Marine Science
Summer. 6 credits. Prerequisite: one year of college biology or other supporting subject. S-U grades optional. A special 4-week course offered twice each summer at Cornell's Shoals Marine Laboratory (SML), on an island off Portsmouth, N.H. For more details and an application, consult the SML Office, G14 Stimson Hall. Estimated cost (includes tuition, room and board, and ferry transportation), $2,295.

Daily lecs, labs, and fieldwork for 4 weeks. 3 core faculty members assisted by up to 15 visiting lecturers, including representatives of governmental agencies and commercial fishermen. SML faculty.

Designed for the student who desires an initial overview of the marine sciences, this course emphasizes living material in natural habitats. Most of the course work is concerned with the biology of intertidal plants and animals, biological oceanography, ichthyology, and fisheries. Attention is also given to introductory physical and chemical oceanography and marine geology. Marine ecology and the effects of human activity on the marine environment are included. Students apply this knowledge by conducting a transect study toward the end of the course.

BIO S 365 Underwater Research
Summer. 4 credits. Prerequisites: one year of college-level biology or other supporting subject, recognized scuba certification, and a medical examination. S-U grades optional. A special 2-week course offered at Cornell's Shoals Marine Laboratory (SML), on an island off Portsmouth, N.H. For more details and an application, consult the SML office, G14 Stimson Hall. Estimated cost (includes tuition, room and board, and ferry transportation), $1,400.

Daily lecs and fieldwork for 2 weeks. Team-taught by a diving-safety officer, two faculty members, and guest lecturers.

For competent divers only. Covers special problems of underwater research, including random sampling, use of dive tables, underwater instrumentation, special diving equipment, photographic techniques, integration with boat and shore facilities, and emergency procedures. Students are required to conduct a transect study on both soft and hard substrates.

BIO S 366–370 SEA Semester
In cooperation with the Sea Education Association (SEA), the Shoals Marine Laboratory office offers a semester-length sequence of courses designed to provide college undergraduates with a thorough academic, scientific, and practical understanding of the sea. *This sequence is repeated approximately once every two months throughout the year.* Students spend the first half of SEA Semester (the six-week shore component) in Woods Hole, Mass., receiving instruction in oceanography, nautical science, and maritime studies. The second half of SEA Semester (the six-week sea component) is spent at sea aboard the R/V *Westward* or the R/V *Corwith Cramer.* Enrollment is open to men and women judged capable of benefiting from SEA Semester; no specific prior training or study is required. Cornell students enrolled in the SEA Semester must take the entire sequence.

For more information, consult the Shoals Marine Laboratory office, G14 Stimson Hall, or call SEA directly at 1-800-552-3633. Program costs are to be paid in place of regular Cornell tuition and fees: tuition for entire 17-credit SEA Semester, about $7,600; room and board about $2,375.

Instructors for the SEA Semester include faculty of the Sea Education Association and the Woods Hole Oceanographic Institution and others.

Shore Component (six weeks)

BIO S 366 SEA Introduction to Oceanography
3 credits. Prerequisites: concurrent enrollment in Biological Sciences 367 and 368. A survey of the characteristics and processes of the global ocean. Oceanographic concepts are introduced and developed from their bases in biology, physics, chemistry, and geology. Provides a broad background in oceanography with special attention to areas pertinent to the subsequent cruise. Guest lecturers from the Woods Hole research community interpret current trends and activities in this rapidly evolving field. Students develop individual projects to be carried out at sea.

BIO S 367 SEA Introduction to Maritime Studies
3 credits. Prerequisite: concurrent enrollment in Biological Sciences 366 and 368. An interdisciplinary consideration of our relationship with the marine environment. Covers the elements of maritime history, law, literature, and art necessary to appreciate our marine heritage and to understand the political and economic problems of contemporary maritime affairs.

BIO S 368 SEA Introduction to Nautical Science
3 credits. Prerequisites: concurrent enrollment in Biological Sciences 366 and 367. An introduction to the technologies of operation at sea. The concepts of navigation (piloting, celestial, and electronic), naval architecture, ship construction, marine engineering systems, and the physics of sail are taught from their bases in astronomy, mathematics, and physics. Provides the theoretical foundation for the navigation, seamanship, and engineering that students employ at sea.

Sea Component (six weeks)
Courses 369 and 370 take place aboard the R/V *Westward*, a 125-foot steel auxiliary-powered staysail schooner built in 1961, or the R/V *Corwith Cramer*, a 134-foot steel auxiliary-powered brigantine built in 1987 for SEA. Both ships normally put to sea with a ship's company of thirty-four. The professional staff of nine includes the captain, the chief scientist, three science watch officers, three deck watch officers, an engineer, and a steward. In addition, one or more visiting investigators are frequently aboard. Up to twenty-five students round out the complement.

BIO S 369 SEA Practical Oceanography I
4 credits. Prerequisite: Biological Sciences 366. Theories and problems raised in the shore component are tested in the practice of oceanography at sea. Students are introduced to the tools and techniques of the practicing oceanographer. During lectures and watch standing, students are instructed in the operation of basic oceanographic equipment; in the methodologies involved in the collection, reduction, and analysis of oceanographic data; and in the attendant operations of a sailing oceanographic research vessel.

BIO S 370 SEA Practical Oceanography II
4 credits. Prerequisite: Biological Sciences 368 and 369. Building on the experience of Practical Oceanography I, students assume increasing responsibility for conducting oceanographic research and overseeing operations of the vessel. The individual student is ultimately responsible directly to the chief scientist and the master of the vessel for the safe and orderly conduct of research activities and related operations of the vessel. Each student undertakes an individual research project designed during the shore component.

BIO S 402 Marine Pollution
Summer. 4 credits. Prerequisite: one year of college-level biology and chemistry or permission of instructor. S-U grades optional. A special 2-week course offered at Cornell's Shoals Marine Laboratory (SML), on an island off Portsmouth, N.H. For more details and an application, consult the SML office, G14 Stimson Hall. Estimated cost (includes tuition, room and board, and ferry transportation), $1,350.

Daily lecs, labs, and fieldwork for 2 weeks. SML faculty.

Dispersion modeling and the effects of pollutants (including oil, outfalls, solid wastes, sludge and dredge spoils, and radioactive wastes) are discussed from the perspectives of elementary physical oceanography and biological processes. Laboratories include basic methods for targeting and tracing wastewater, organic carbon determinations, and practical field projects.

BIO S 409 Ciliophorology
Summer. 2 credits. Prerequisite: permission of instructor. A special 1-week course offered at Cornell's Shoals Marine Laboratory (SML) on an island off Portsmouth, N.H. For more details and an application, consult the SML office, G14 Stimson Hall. Estimated cost (includes tuition, room and board, and ferry transportation), $725.

Daily lecs and labs for 1 week. SML faculty.

A special course that examines ciliophoran biology in depth through lectures and laboratory exercises. Topics include a detailed look at the ciliate faunules found in such diverse habitats as saltmarshes, sandy sediment interstitial spaces, the Gulf Stream and the Sargasso Sea, marine caves, and benthic hydrothermal vents. Laboratory focuses on examining silver stained specimens, and covers staining techniques, as well as back scattered and secondary SEM and TEM methodologies.

BIO S 413 Adaptations of Marine Organisms
Summer. 6 credits. Prerequisite: Biological Sciences 364 or a course in physiological ecology. S-U grades optional. A special 3-week course offered at Cornell's Shoals Marine Laboratory (SML) on an island off Portsmouth, N.H. For more details and an application, consult the SML office, G14 Stimson Hall. Estimated cost (includes tuition, room and board, and ferry transportation), $1,895.

Daily lecs, labs, and fieldwork for 3 weeks. SML faculty.

An introduction to the physiological ecology and functional morphology of marine plants and animals, with emphasis on selected algal and invertebrate examples from the Gulf of Maine. Topics covered include photosynthesis in the marine environment; respiration in intertidal organisms; carbohydrates, proteins, and lipids as nutrients in the sea; acclimation and tolerance of tide-pool biota; and biological responses to competition and grazing. Field and laboratory exercises explore principles and procedures used to characterize the physical, chemical, and biotic environment of intertidal and shallow subtidal organisms, including determination of temperature, light, salinity, oxygen and nutrient levels, and *in vivo* functional analyses of metabolic phenomena.

BIO S 449 Marine Botany: Ecology of Marine Plants

Summer. 4 credits. Prerequisite: Biological Sciences 364 or general familiarity with marine algae. S-U grades optional. A special 2-week course offered at Cornell's Shoals Marine Laboratory (SML), on an island off Portsmouth, N.H. For more details and an application, consult the SML office, G14 Stimson Hall. Estimated cost (includes tuition, room and board, and ferry transportation), $1,395.

Daily lecs, labs, and fieldwork for 2 weeks. SML faculty.

An overview of the major marine algal groups, including aspects of anatomy, morphology, development, life histories, physiology, and use. Laboratories and fieldwork emphasize relationships between distribution and major environmental parameters and involve student projects.

BIO S 454 Marine Microbial and Plankton Ecology

Summer. 4 credits. Prerequisites: one year each of introductory college biology and chemistry. S-U grades optional. A special 2-week course offered at Cornell's Shoals Marine Laboratory (SML) on an island off Portsmouth, N.H. For more details and an application, consult the SML office, G14 Stimson Hall. Estimated cost (includes tuition, room and board, and ferry transportation), $1,350.

Daily lecs, labs, and fieldwork for 2 weeks. SML faculty.

A lecture, field, and laboratory course which examines the plethora of single-celled organisms, including bacteria, unicellular algae, fungi, heterotrophic/mixotrophic flagellates, amoebae, ciliates and multicellular planktonic organisms (coelenterates, crustaceans, ctenophores, chaetognaths, tunicates, and larvae of assorted benthic invertebrates) that make the marine environment their home. The course emphasizes the role of these organisms in marine food webs and their importance to biological oceanographic processes.

BIO S 477 Marine Vertebrates

Summer. 6 credits. Prerequisite: Biological Sciences 364 or 274 or a course in vertebrate biology. S-U grades optional. A special 3-week course offered at Cornell's Shoals Marine Laboratory (SML), on an island off Portsmouth, N.H. For more details and an application, consult the SML office, G14 Stimson Hall. Estimated cost (includes tuition, room and board, and ferry transportation), $1,895.

Daily lecs, labs, and fieldwork for 3 weeks. SML faculty.

Topics in marine vertebrate biology emphasizing laboratory studies, field collections or observations, and readings from the current literature. Topics covered include systematics of fishes of the Gulf of Maine, elasmobranch physiology, interpretation of life history and parameters from otolith microstructure, teleost skeletomuscular structure and function, population biology and the contemporary Gulf of Maine fishery, Mesozoic marine reptiles, the biology of sea turtles in cold water, coloniality in sea birds, avian adaptations to life at sea, evolution and systematics of marine mammals, diving physiology, and ecology and conservation of existing marine mammal populations. Dissection of vertebrate animals is a part of one or more laboratory sessions.

AGEC The History and Economics of Whaling in North America (Agricultural Economics 454 and History 413)

Summer. 2 credits. A special 2-week course offered at Cornell's Shoals Marine Laboratory (SML), on an island off Portsmouth, N.H. For more details and an application, consult the SML office, G14 Stimson Hall. Estimated cost (includes tuition, room and board, and ferry transportation), $675.

Daily lecs, labs, and fieldwork for 2 weeks. D. H. Usner, J. M. Conrad.

The whaling industry of nineteenth-century America presents a rich tapestry for studying the people, resources, and technology that contributed to the economic development of the United States. This course examines the species of whales on which that industry was based, aboriginal and colonial whaling, the golden era of the American fishery, whaling in the western Arctic, and the decline and demise of the industry in the early twentieth century. Social relationships, cross-cultural influences, markets, resource dynamics, and technical change are all evident in the rise and fall of this unique American industry.

ARKEO Archaeology of Maritime Communities (Archaeology 300: Individual Study in Archaeology)

Summer. 2 credits. Prerequisite: a strong interest in history or permission of instructor. A special 1-week course offered at Cornell's Shoals Marine Laboratory (SML), on an island off Portsmouth, N.H. For more details and an application, consult the SML office, G14 Stimson Hall. Estimated cost (includes tuition, room and board, and ferry transportation), $725.

Daily lecs, labs, and fieldwork for 1 week. SML faculty.

Fieldwork on various land sites and their adjacent offshore marine environments. Artifact analysis, preliminary conservation, and the proper recording of finds are emphasized. Methods of archaeological research, including the use of archives and historical materials, and publication methodologies as well as the larger questions in the discipline are discussed.

ARKEO Archaeology Underwater (Archaeology 319)

Summer. 2 credits. Prerequisites: recognized scuba certification and a medical examination required for students engaging in underwater research; also open to non-divers. A special 1-week course offered at Cornell's Shoals Marine Laboratory (SML), on an island off Portsmouth, N.H. For more details and an application, consult the SML office, G14 Stimson Hall. Estimated cost (includes tuition, room and board, and ferry transportation), $825.

Daily lecs, labs, and fieldwork for 1 week. SML faculty.

An introduction to the subject and a review of this contemporary subdiscipline of archaeology. The approach of the course is practical, with a strong potential for actual on-site experience in search, site recognition, survey, and recording. The course also covers the history and development of the subject, the legal aspects of underwater research, and the worldwide potential of the field. Since any archaeological research project involves a great deal more than digging, the course provides ample opportunities for those who are interested in the subject but are not divers or sufficiently experienced in scuba.

GEOL Marine and Coastal Geology (Geological Sciences 213)

Summer. 2 credits. Prerequisite: an introductory course in geology or permission of instructor. A special 1-week course offered at Cornell's Shoals Marine Laboratory (SML), on an island off Portsmouth, N.H. For more details and an application, consult the SML office, G14 Stimson Hall. Estimated cost (includes tuition, room and board, and ferry transportation), $725.

Daily lecs, labs, and fieldwork for 1 week. SML faculty.

With "the New England coast" defined as beginning at the -200 meter isobath and proceeding westward, this course examines specific geological events and processes important in shaping the area's bedrock and surficial sediments. Petrology, geophysics, and the Pleistocene geology of the region are investigated. Consideration of the geologic history of New England within the plate tectonic model is emphasized. Examination of insular geology is used to integrate micro-, meso-, and macroscale geological evolution of continental margins in general. Marine geology is approached through basic geophysical exploration and bottom-sediment collection followed by data analysis and interpretation. Experience aboard a coastal research vessel is an integral part of the course.

NTRES Coastal and Oceanic Law and Policy (Natural Resources 306)

Summer. 2 credits. A special 1-week course offered at Cornell's Shoals Marine Laboratory (SML) on an island off Portsmouth, N.H. For more details and an application, consult the SML office, G14 Stimson Hall. Estimated cost (includes tuition, room and board, and ferry transportation), $725.

Daily lecs and discs for 1 week. SML faculty.

Intended for persons interested in careers in management of marine or coastal resources or in the natural sciences. Subjects include law and policy related to ocean dumping, marine sanctuaries, environmental impact statements, water and air pollution, fisheries management, offshore gas and oil production, and territorial jurisdiction. Lectures on the status and history of law are accompanied by discussion of relevant policy and analysis of the efficacy of various legal techniques. A case study that requires extensive use of the laboratory's library and personnel is assigned. The week concludes with a mock hearing.

NTRES Wetland Resources (Natural Resources 417)
Summer. 2 credits. Prerequisite: one year of college-level biology. A special 1-week course offered at Cornell's Shoals Marine Laboratory (SML), on an island off Portsmouth, N.H. For more details and an application, consult the SML office, G14 Stimson Hall. Estimated cost (includes tuition, room and board, and ferry transportation), $725.

Daily lecs, labs, and fieldwork for 1 week. SML faculty.

An examination of coastal and adjacent freshwater wetlands from historic, destruction, and preservation perspectives, including fresh- and salt-marsh ecology and management. Field trips to selected examples of the wetlands under discussion and follow-up laboratories emphasize successional features, plant identification and classification, and examination of the dominant insect and vertebrate associations.

COURSES IN BIOPHYSICS

Biophysics is an interdisciplinary undergraduate and graduate program. Information on this independent option is available in the Office for Academic Affairs, 200 Stimson Hall. Graduate study and research in biophysics are available through several Graduate Fields. Students interested in graduate work in biophysics should inquire at the Program in Biophysics Office, 210 Clark Hall.

The following courses are available for students interested in biophysics:

Biomechanical Systems—Analysis and Design (Mechanical and Aerospace Engineering 565)

Chemistry of Nucleic Acids (Chemistry 677)

Computer Interfacing for Neurobiologists (Biological Sciences 422)

Electron Microscopy for Biologists (Biological Sciences 401, 403, 405, 606, 608)

Electronics for Neurobiology (Biological Sciences 426)

Enzyme Catalysis and Regulation (Chemistry 672)

Membrane Biophysics (Applied and Engineering Physics 615)

Membranes and Bioenergetics (Biological Sciences 632)

Membrane Ion Channels (Biological Sciences 495)

Neurochemistry and Molecular Neurobiology (Biological Sciences 497)

Neuroethology (Biological Sciences 424)

Photosynthesis (Biological Sciences 445)

Physical Chemistry of Proteins (Chemistry 686)

Principles of Neurophysiology (Biological Sciences 491)

Protein Structure and Function (Biological Sciences 631)

Special Topics in Biophysical and Bioorganic Chemistry (Chemistry 782)

Transport of Solutes and Water in Plants (Biological Sciences 649)

FACULTY ROSTER

New York State College of Agriculture and Life Sciences

Adler, Kraig K., Ph.D., U. of Michigan. Prof., Neurobiology and Behavior

Anderson, John M., Ph.D., New York U. Prof. Emeritus of Zoology, Genetics and Development

Banks, Harlan P., Ph.D., Cornell U. Liberty Hyde Bailey Prof. of Botany Emeritus, Plant Biology

Barker, Robert, Ph.D., U. of California at Berkeley. Prof., Biochemistry, Molecular and Cell Biology/Center for the Environment

Bates, David M., Ph.D., U. of California at Los Angeles. Prof., Bailey Hortorium

Beyenbach, Klaus W., Ph.D., Washington State U. Prof., Physiology/Veterinary Physiology†

Bruns, Peter J., Ph.D., U. of Illinois. Prof., Genetics and Development

Cade, Thomas J., Ph.D., U. of California at Los Angeles. Prof. Emeritus of Zoology, Ecology and Systematics

Calvo, Joseph M., Ph.D., Washington State U. William T. Keeton Professor in Biological Sciences; Biochemistry, Molecular and Cell Biology

Chabot, Brian F., Ph.D., Duke U. Prof., Ecology and Systematics

Clayton, Roderick K., Ph.D., California Inst. of Technology. Prof. Emeritus, Plant Biology

Crepet, William L., Ph.D., Yale U. Prof., Bailey Hortorium

Daniel, Louise J., Ph.D., Cornell U. Prof. Emeritus, Biochemistry

Davies, Peter J., Ph.D., U. of Reading (England). Prof., Plant Biology

Davis, Jerrold I., Ph.D., U. of Washington. Asst. Prof., Bailey Hortorium

Delwiche, Eugene A., Ph.D., Cornell U. Prof. Emeritus, Microbiology

Dondero, Norman C., Ph.D., Cornell U. Prof. Emeritus, Microbiology

Doyle, Jeffrey J., Ph.D., Indiana U. Assoc. Prof., Bailey Hortorium

Dress, William J., Ph.D., Cornell U. Prof. Emeritus, Bailey Hortorium

Ealick, Steven E., Ph.D., U. of Oklahoma. Prof., Biochemistry, Molecular and Cell Biology

Eisner, Thomas, Ph.D., Harvard U. Jacob Gould Schurman Professor, Neurobiology and Behavior

Emlen, Stephen T., Ph.D., U. of Michigan. Prof., Neurobiology and Behavior

Feeny, Paul P., Ph.D., Oxford U. (England). Prof., Ecology and Systematics/Entomology

Fox, Thomas D., Ph.D., Harvard U. Assoc. Prof., Genetics and Development

Ghiorse, William C., Ph.D. Rensselaer Polytechnic Inst. Prof., Microbiology

Gibson, Jane, Ph.D., U. of London (England). Prof., Biochemistry, Molecular and Cell Biology

Goldberg, Michael L., Ph.D., Stanford U. Assoc. Prof., Genetics and Development

Hanson, Maureen R., Ph.D., Harvard U. Assoc. Prof., Genetics and Development

Harrison, Richard G., Ph.D., Cornell U. Prof., Ecology and Systematics

Harris-Warrick, Ronald M., Ph.D., Stanford U. Prof., Neurobiology and Behavior

Harvell, C. Drew, Ph.D., U. of Washington. Assoc. Prof., Ecology and Systematics

Helmann, John D., Ph.D., U. of California at Berkeley. Asst. Prof., Microbiology

Hopkins, Carl D., Ph.D., Rockefeller U. Prof., Neurobiology and Behavior

Ingram, John W., Ph.D., U. of California at Berkeley. Prof. Emeritus, Bailey Hortorium

Jagendorf, Andre T., Ph.D., Yale U. Liberty Hyde Bailey Professor of Plant Physiology, Plant Biology*

Keller, Elizabeth B., Ph.D., Cornell U. Prof. Emeritus, Biochemistry, Molecular and Cell Biology

Kemphues, Kenneth J., Ph.D., Indiana U. Assoc. Prof., Genetics and Development

Kingsbury, John M., Ph.D., Harvard U. Prof. of Botany Emeritus, Plant Biology

Lis, John T., Ph.D., Brandeis U. Prof., Biochemistry, Molecular and Cell Biology

Loew, Ellis R., Ph.D., U. of California at Los Angeles. Assoc. Prof., Physiology/Veterinary Physiology†

Luckow, Melissa A., Ph.D., U. of Texas at Austin. Asst. Prof., Bailey Hortorium

MacDonald, Russell E., Ph.D., U. of Michigan. Prof. Emeritus, Biochemistry

MacIntyre, Ross J., Ph.D., Johns Hopkins U. Prof., Genetics and Development

Marks, Peter L., Ph.D., Yale U. Prof., Ecology and Systematics*

McCune, Amy R., Ph.D., Yale U. Assoc. Prof., Ecology and Systematics

Mortlock, Robert P., Ph.D., U. of Illinois. Prof., Microbiology

Nasrallah, June B., Ph.D., Cornell U. Assoc. Prof., Plant Biology

Naylor, Harry B., Ph.D., Cornell U. Prof. Emeritus, Microbiology

Niklas, Karl J., Ph.D., U. of Illinois. Prof., Plant Biology

Nixon, Kevin C., Ph.D., U. of Texas at Austin. Assoc. Prof., Bailey Hortorium

Owens, Thomas G., Ph.D., Cornell U. Asst. Prof., Plant Biology

Paolillo, Dominick J., Jr., Ph.D., U. of California at Davis. Prof., Plant Biology

Parthasarathy, Mandayam V., Ph.D., Cornell U. Prof., Plant Biology

Pough, F. Harvey, Ph.D., U. of California at Los Angeles. Prof., Ecology and Systematics/Physiology

Quaroni, Andrea, Ph.D., U. of Pavia (Italy). Assoc. Prof., Physiology

Roberts, Jeffrey W., Ph.D., Harvard U. Prof., Biochemistry, Molecular and Cell Biology*

Root, Richard B., Ph.D., U. of California at Berkeley. Prof., Ecology and Systematics/Entomology

Russell, James B., Ph.D., U. of California at Davis. Prof., Microbiology

Seeley, Jr., Harry W., Ph.D., Cornell U. Prof. Emeritus, Microbiology

Shalloway, David I., Ph.D., Massachusetts Inst. of Technology. Greater Philadelphia Prof., Biochemistry, Molecular and Cell Biology

Spanswick, Roger M., Ph.D., U. of Edinburgh (Scotland). Prof., Plant Biology

Srb, Adrian M., Ph.D., Stanford U. Jacob Gould Schruman Prof. Emeritus of Genetics, Genetics and Development

Steward, Frederick C., Ph.D., U. of Leeds (England). Charles A. Alexander Prof. of Biological Sciences Emeritus

Stewart, Valley J., Ph.D., U. of Virginia. Assoc. Prof., Microbiology

Tye, Bik-Kwoon, Ph.D., Massachusetts Inst. of Technology. Prof., Biochemistry, Molecular and Cell Biology

Uhl, Charles H., Ph.D., Cornell U. Prof. Emeritus, Plant Biology

Uhl, Natalie W., Ph.D., Cornell U. Prof. Emeritus, Bailey Hortorium

van Tienhoven, Ari, Ph.D., U. of Illinois. Prof. Emeritus, Physiology

Vogt, Volker M., Ph.D., Harvard U. Prof., Biochemistry, Molecular and Cell Biology
Walcott, Charles, Ph.D., Cornell U. Prof., Neurobiology and Behavior/Laboratory of Ornithology
Wayne, Randy O., Ph.D., U. of Massachusetts. Asst. Prof., Plant Biology
Winans, Stephen C., Ph.D., Massachusetts Inst. of Technology. Asst. Prof., Microbiology
Winkler, David W., Ph.D., U. of California at Berkeley. Asst. Prof., Ecology and Systematics
Wu, Ray, Ph.D., U. of Pennsylvania. Prof., Biochemistry, Molecular and Cell Biology
Zahler, Stanley A., Ph.D., U. of Chicago. Prof., Genetics and Development*
Zinder, Stephen H., Ph.D., U. of Wisconsin. Assoc. Prof., Microbiology

Other Teaching Personnel

Alexander, Renee R., Ph.D., Cornell U. Sr. Lecturer, Biochemistry, Molecular and Cell Biology
Cordts, Marcia L., Ph.D., Cornell U. Sr. Lecturer, Microbiology
Ecklund, P. Richard, Ph.D., Oregon State U. Lecturer, Neurobiology and Behavior
Ferger, Martha F., Ph.D., Cornell U. Medical College. Sr. Lecturer, Biochemistry, Molecular and Cell Biology
Glase, Jon C., Ph.D., Cornell U. Sr. Lecturer, Neurobiology and Behavior
Griffiths, Joan M., Ph.D., Cornell U. Lecturer, Biochemistry, Molecular and Cell Biology
Heiser, John B., Ph.D., Cornell U. Sr. Lecturer, Ecology and Systematics
McFadden, Carol H., Ph.D., Cornell U. Sr. Lecturer, Physiology
Merkel, Susan, M.S., Cornell U. Lecturer, Microbiology
Rehkugler, Carole M., M.S., Cornell U. Sr. Lecturer, Microbiology
Reiss, H. Carol, M.S., Cornell U. Sr. Lecturer, Plant Biology

Joint Appointees

Bloom, Stephen E., Assoc. Prof., Poultry and Avian Sciences/Biological Sciences
Borror, Arthur C., Adjunct Prof., U. of New Hampshire/Biological Sciences
Butler, Walter R., Assoc. Prof., Animal Science/Physiology
Edelstein, Stuart M., Adjunct Prof., U. of Geneva (Switzerland)/Biochemistry, Molecular and Cell Biology
Foote, Robert H., Jacob Gould Schurman Professor, Animal Science/Physiology
Greene, Charles H., Adjunct Asst. Prof., Center for the Environment
Howell, Stephen H., Adjunct Prof., Boyce Thompson Institute/Plant Biology
Kochian, Leon V., Adjunct Asst. Prof., USDA Science and Education Administration/Plant Biology
Korf, Richard P., Prof., Plant Pathology/Bailey Hortorium
LaRue, Thomas A., Adjunct Prof., Boyce Thompson Institute/Plant Biology
Last, Robert L., Adjunct Asst. Prof., Boyce Thompson Institute/Genetics and Development
Leopold, A. Carl, Adjunct Prof., Boyce Thompson Institute/Plant Biology
McCarty, Richard E., Adjunct Prof., Johns Hopkins U./Biochemistry, Molecular and Cell Biology
Moffat, J. Keith, Adjunct Prof., U. of Chicago/Biochemistry, Molecular and Cell Biology
Pimentel, David, Prof., Entomology/Ecology and Systematics
Richmond, Milo E., Assoc. Prof., USDI Fish and Wildlife Service/Natural Resources/Ecology and Systematics
Rossman, Michael J., Adjunct Prof., Purdue U./Biochemistry, Molecular and Cell Biology
Stern, David B., Adjunct Asst. Prof., Boyce Thompson Institute/Plant Biology
Thompson, John F., Adjunct Prof., USDA Science and Education Administration/Plant Biology
Via, Sara, Assoc. Prof., Entomology/Ecology and Systematics
Weeden, Norman F., Assoc. Prof., Horticultural Sciences/Bailey Hortorium
Wheeler, Quentin D., Assoc. Prof., Entomology/Bailey Hortorium

College of Arts and Sciences

Aquadro, Charles F., Ph.D., U. of Georgia. Assoc. Prof., Genetics and Development/Ecology and Systematics
Bass, Andrew H., Ph.D., U. of Michigan. Assoc. Prof., Neurobiology and Behavior
Blackler, Antonie W., Ph.D., U. of London (England). Prof., Genetics and Development
Booker, Ronald, Ph.D., Princeton U. Asst. Prof., Neurobiology and Behavior
Bretscher, Anthony P., Ph.D., Leeds U. (England). Assoc. Prof., Biochemistry, Molecular and Cell Biology
Brown, William J., Ph.D., U. of Texas Health Science Center at Dallas. Asst. Prof., Biochemistry, Molecular and Cell Biology
Capranica, Robert R., Sc.D., Massachusetts Inst. of Technology. Prof., Neurobiology and Behavior
Dawson, Todd E., Ph.D., U. of Washington. Asst. Prof., Ecology and Systematics
Feigenson, Gerald W., Ph.D., California Inst. of Technology. Prof., Biochemistry, Molecular and Cell Biology
Geber, Monica A., Ph.D., U. of Utah. Asst. Prof., Ecology and Systematics
Gibson, Quentin H., Ph.D./D.Sc., Queen's U. (Northern Ireland). Greater Philadelphia Professor Emeritus in Biological Sciences, Biochemistry, Molecular and Cell Biology
Gilbert, Perry W., Ph.D., Cornell U. Prof. Emeritus, Neurobiology and Behavior
Hairston, Nelson G., Jr., Ph.D., U. of Washington. Prof., Ecology and Systematics
Halpern, Bruce P., Ph.D., Brown U. Prof., Neurobiology and Behavior/Psychology
Hamill, Owen P., Ph.D., U. of New South Wales (Australia). Asst. Prof., Neurobiology and Behavior
Heppel, Leon A., Ph.D., U. of California at Berkeley. Prof. Emeritus, Biochemistry, Molecular and Cell Biology
Hess, George P., Ph.D., U. of California at Berkeley. Prof., Biochemistry, Molecular and Cell Biology
Hinkle, Peter C., Ph.D., New York U. Prof., Biochemistry, Molecular and Cell Biology
Howarth, Robert W., Ph.D., Massachusetts Inst. of Technology/Woods Hole Oceanographic Institution. Prof., Ecology and Systematics
Howland, Howard C., Ph.D., Cornell U. Prof., Neurobiology and Behavior/Physiology
Hoy, Ronald R., Ph.D., Stanford U. Prof., Neurobiology and Behavior‡
Huffaker, Tim C., Ph.D., Massachusetts Inst. of Technology. Asst. Prof., Biochemistry, Molecular and Cell Biology
Karplus, P. Andrew, Ph.D., U. of Washington. Asst. Prof., Biochemistry, Molecular and Cell Biology
Kennedy, Kenneth A. R., Ph.D., U. of California at Berkeley. Prof., Ecology and Systematics
Leonard, Samuel L., Ph.D., U. of Wisconsin. Prof. Emeritus of Endocrinology, Genetics and Development
MacDonald, June M. Fessenden, Ph.D., Tufts U. Assoc. Prof., Biochemistry, Molecular and Cell Biology/Program on Science, Technology, and Society
Mark, Willie H., Ph.D., U. of Wisconsin at Madison. Asst. Prof., Genetics and Development
McClearn, Deedra K., Ph.D., Harvard U. Asst. Prof., Ecology and Systematics
McFarland, William N., Ph.D., U. of California at Los Angeles. Prof. Emeritus of Zoology, Ecology and Systematics/Physiology
Podleski, Thomas R., Ph.D., Columbia U. Prof., Neurobiology and Behavior‡
Power, Alison G., Ph.D., U. of Washington. Assoc. Prof., Ecology and Systematics/Science and Technology Studies
Provine, William B., Ph.D., U. of Chicago. Prof., Ecology and Systematics/History
Salpeter, Miriam M., Ph.D., Cornell U. Prof., Neurobiology and Behavior/Applied and Engineering Physics§
Schneiderman, Anne M., Ph.D., Harvard U. Asst. Prof., Neurobiology and Behavior
Seeley, Thomas D., Ph.D., Harvard U. Assoc. Prof., Neurobiology and Behavior
Sherman, Paul W., Ph.D., U. of Michigan. Prof., Neurobiology and Behavior
Silver, Robert B., Ph.D., U. of California at Berkeley. Assoc. Prof., Physiology
Turgeon, Robert, Ph.D., Carleton U. (Canada). Assoc. Prof., Plant Biology
Wilson, David B., Ph.D., Stanford U. Prof., Biochemistry, Molecular and Cell Biology
Wolfner, Mariana F., Ph.D., Stanford U. Assoc. Prof., Genetics and Development

Other Teaching Personnel

Albrecht, Genia S., Ph.D., U. of Washington. Sr. Lecturer, Biochemistry, Molecular and Cell Biology
Calvo, Rita A., Ph.D., Cornell U. Sr. Lecturer, Genetics and Development
Eberhard, Carolyn, Ph.D., Boston U. Sr. Lecturer, Plant Biology

Joint Appointees

Adkins-Regan, Elizabeth, Prof., Psychology/Neurobiology and Behavior
Levin, Simon A., Adjunct Prof., Ecology and Systematics‡
Likens, Gene E., Adjunct Prof., New York Botanical Garden Institute of Ecosystem Studies, Cary Arboretum/Ecology and Systematics

New York State College of Veterinary Medicine

Corradino, Robert A., Ph.D., Cornell U. Assoc. Prof., Physiology/Veterinary Physiology
Fortune, Joanne E., Ph.D., Cornell U. Assoc. Prof., Physiology/Veterinary Physiology
Gasteiger, Edgar L., Ph.D., U. of Minnesota. Prof. Emeritus, Physiology
Gilmour, Robert F., Ph.D., SUNY Upstate Medical Center. Assoc. Prof., Physiology
Hansel, William, Ph.D., Cornell U. Liberty Hyde Bailey Prof. Emeritus, Physiology
Lengemann, Frederick W., Ph.D., U. of Wisconsin at Madison. Prof. Emeritus, Physiology
Robertshaw, David, Ph.D., Glasgow U. (Scotland). Prof., Physiology/Veterinary Physiology

Tapper, Daniel N., Ph.D., Cornell U. Prof., Physiology/Veterinary Physiology
Wasserman, Robert H., Ph.D., Cornell U. Prof., Physiology/Veterinary Physiology/Nutritional Sciences*‡

Joint Appointees

Dobson, Alan, Prof., Veterinary Physiology/Physiology
Houpt, Katherine A., Prof., Veterinary Physiology/Physiology
Houpt, T. Richard, Prof., Veterinary Physiology/Physiology
Nathanielsz, Peter W., Leading Prof., Clinical Sciences/Veterinary Physiology/Physiology
Sellers, Alvin F., Ph.D. U. of Pennsylvania. Prof. of Veterinary Physiology Emeritus, Physiology
Wootton, John F., Prof., Veterinary Physiology/Physiology

College of Engineering

Joint Appointees

Cisne, John L., Assoc. Prof., Geological Sciences/Biological Sciences
Webb, Watt W., Prof., Applied and Engineering Physics/Biological Sciences

Division of Biological Sciences

Stinson, Harry T., Jr., Ph.D., Indiana U. Prof., Biological Sciences/Genetics and Development*

Division of Nutritional Sciences

Joint Appointees

Arion, William J., Prof., Nutritional Sciences/Biochemistry, Molecular and Cell Biology
Bensadoun, Andre, Prof., Nutritional Sciences/Physiology
Kazarinoff, Michael N., Assoc. Prof., Nutritional Sciences/Biochemistry, Molecular and Cell Biology
Wright, Lemuel D., Ph.D., Oregon State Coll. Prof. Emeritus, Nutritional Sciences/Biochemistry

*Joint appointment with the College of Arts and Sciences.
†Joint appointment with the College of Veterinary Medicine.
‡Joint appointment with the College of Agriculture and Life Sciences.
§Joint appointment with the College of Engineering.

COLLEGE OF ENGINEERING

ADMINISTRATION

William B. Streett, dean

K. Bingham Cady, associate dean for college affairs

S. Leigh Phoenix, associate dean for research and graduate studies

Gerald Rehkugler, associate dean for undergraduate programs

Murray Death, assistant dean for development and alumni relations

Mark K. Spiro, assistant dean for administration

Mary Thompson, assistant dean for minority programs

Richard Hale, assistant dean and director of admissions

Richard K. Mosher, registrar

FACILITIES AND SPECIAL PROGRAMS

Most of the academic units of the College of Engineering are on the Joseph N. Pew, Jr. Engineering Quadrangle. Facilities for applied and engineering physics are located in Clark Hall on the College of Arts and Sciences campus, and facilities for agricultural engineering are centered in Riley-Robb Hall on the campus of the New York State College of Agriculture and Life Sciences.

Special university and college facilities augment the laboratories operated by the various engineering schools and departments, and special centers and programs contribute to opportunities for study and research.

Computing equipment, for example, is available through centers administered by the university and by the College of Engineering, as well as in laboratories run by schools, departments, or programs. The university facilities include personal computers for student use, terminals connected to the mainframe, computer-graphics equipment, and a supercomputer. The College of Engineering operates, in addition to several computing centers for student use, the Computer-Aided Design Instructional Facility, which provides advanced computer-graphics equipment used in course work throughout the college.

Cornell programs and centers of special interest in engineering include the following:

Center for Applied Mathematics. A cross-disciplinary center that administers a graduate program.

Center for the Environment. A sponsor of interdisciplinary programs that are currently in the areas of environmental law and policy, ecosystem research, remote sensing, water resources, the global environment, biological resources, waste management, and solid-waste combustion.

Center for Radiophysics and Space Research. An interdisciplinary unit that facilitates research in astronomy and the space sciences.

Center for Theory and Simulation in Science and Engineering. A national supercomputer facility used for advanced research in engineering and the physical and biological sciences.

Cornell Electronic Packaging Alliance. A cooperative venture involving Cornell and several corporations in the areas of computing and microelectronics, organized to undertake precompetitive, interdisciplinary research in electronic packaging.

Cornell High Energy Synchrotron Source. A high-energy synchrotron radiation laboratory operated in conjunction with the university's high-energy storage ring.

Cornell Manufacturing Engineering and Productivity Program. A joint venture of Cornell, industrial organizations, and the federal government to encourage the development and implementation of modern manufacturing systems.

Cornell Program in Power Systems Engineering. A research and instructional program centered in a laboratory that has a complete real-time model of an electric power system.

Cornell Waste Management Institute. A research, teaching, and extension program within the Center for Environmental Research that addresses the environmental, technical, and economic issues associated with solid waste; one facility sponsored by the institute is the Combustion Simulation Laboratory in the Sibley School of Mechanical and Aerospace Engineering.

Institute for the Study of the Continents. An interdisciplinary organization that promotes research on the structure, composition, and evolution of the continents.

Laboratory of Plasma Studies. A center for interdisciplinary research in plasma physics and lasers.

Materials Science Center. An interdisciplinary facility with substantial support from the National Science Foundation, providing sophisticated equipment.

Mathematical Sciences Institute. An interdisciplinary program in applications of mathematics funded by the U.S. Army.

National Astronomy and Ionosphere Center. The world's largest radio-radar telescope facility, operated by Cornell in Puerto Rico.

National Earthquake Engineering Research Center. A facility recently established by the National Science Foundation at a group of universities in New York State.

National Nanofabrication Facility. A center that provides equipment and services for research in the science, engineering, and technology of structures (including electronic components) with dimensions as small as the nanometer range.

Program of Computer Graphics. An interdisciplinary research center that operates one of the most advanced computer-graphics laboratories in the United States.

Program on Science, Technology, and Society. A cross-disciplinary unit that sponsors courses and promotes research.

SRC Center for the Program on Microscience and Technology. A center sponsored by the Semiconductor Research Corporation to promote research essential to the development of VLSI devices and circuits.

Statistics Center. Coordinates a university-wide program in statistics and probability.

Ward Laboratory of Nuclear Engineering. Irradiation, isotope production, and activation analysis facilities for interdisciplinary research.

Programs sponsored by College of Engineering units include several for industrial affiliates. These are in the areas of injection molding, computer science, materials science, geologic study of the continents, and nanometer structures.

DEGREE PROGRAMS

Cornell programs in engineering and applied science lead to the degrees of Bachelor of Science, Master of Engineering (with field designation), Master of Science, and Doctor of Philosophy.

General academic information concerning the Bachelor of Science degree is given here under the heading "Undergraduate Study." Curricula for major studies are described under the various academic areas.

Programs leading to the Master of Science and Doctor of Philosophy degrees are administered by the Graduate School. They are described in the *Announcement of the Graduate School* and the special announcement *Graduate Study in Engineering and Applied Science.* The professional Master of Engineering programs and cooperative programs with the Johnson Graduate School of Management are described below.

UNDERGRADUATE STUDY

Bachelor of Science (B.S.) degrees are offered in the following areas:*

Agricultural and biological engineering†

Chemical engineering

Civil engineering

College program

Computer science

Electrical engineering

Engineering physics

Geological sciences

Materials science and engineering

Mechanical engineering

Operations research and engineering

Students in the College of Engineering begin their undergraduate studies in the Common Curriculum, which is administered by the faculty members of the College Curriculum Governing Board (CCGB) through the associate dean for undergraduate programs and the Engineering Advising office. Subsequently most students enter *field* programs, which are described separately for each academic area. Alternatively students may enter the *College Program* (described below), which permits them to pursue a course of study adapted to individual interests.

Students interested in bioengineering may arrange a suitable curriculum within one of the field programs or through the College Program. Information about these options is available in the Office of Undergraduate Programs, 223 Carpenter Hall.

*Agricultural engineering, chemical engineering, civil engineering, electrical engineering, engineering physics, materials science and engineering, mechanical engineering, and operations research and engineering are accredited by the Engineering Accreditation Commission of the Accreditation Board for Engineering and Technology.

†To major in agricultural engineering students normally enroll in the College of Agriculture and Life Sciences for the first, second, and fourth years, and jointly in that college and the College of Engineering for the third year. However, students enrolled in the College of Engineering for the first two years may affiliate with the field of agricultural engineering and enroll in the College of Agriculture and Life Sciences for the third and fourth years.

Requirements for Graduation

To receive the Bachelor of Science degree, students must meet the requirements of the Common Curriculum, as set forth by the College of Engineering, including the requirements of the field program, as established by the school or department with which they become affiliated. The Common Curriculum is composed of courses in eight categories.

Course Category		*Credits*
1)	Mathematics	16
2)	Physics	12
3)	Chemistry	4
4)	Freshman writing seminar	6
5)	Computer programming	4
6)	Engineering distribution (4 courses)	12
7)	Liberal studies distribution (6 courses)	18
8)	Electives:	
	Approved electives	9
	Free electives	6
	Technical electives	6

One writing-intensive technical course or a course in technical or scientific writing must also be taken; this course may simultaneously satisfy some other requirement.

One approved course in computing applications must also be taken; this course may simultaneously satisfy some other requirement, such as an engineering distribution course, an approved or technical elective, or a field course.

Credits for courses in the field program vary between 36 and 48, depending on which program is chosen. Because of this variation the credits needed for graduation range between 129 and 141. Two terms of physical education must be taken in the freshman year to satisfy a university requirement.

Mathematics

The normal program in mathematics includes Mathematics/T&AM 191,192, 293, and 294. Every student must attain a grade of at least C– in Mathematics/T& AM 191, 192, 293, and 294, or other courses that may be approved as substitutes for these courses. If this requirement is not met the first time a course is taken, the course must be repeated immediately and a satisfactory grade attained before the next course in the sequence may be taken. Courses that are taken a second time in order to meet this requirement do not yield additional credit toward a degree.

Physics

The normal program in physics includes Physics 112, 213, and 214 or the corresponding honors courses (Physics 116, 217, and 218). Engineering students are required to have attained a minimum grade of C- in Mathematics/T&AM 191 or equivalent before taking Physics 112. The same minimum grade is required in each subsequent mathematics course before taking the physics course for which it is a prerequisite (e.g., C- in Mathematics 192 before taking Physics 213, or C- in Mathematics 293 before taking Physics 214). Students in the field programs of ABEN, CEE, or OR&IE may substitute Chemistry 208 for Physics 214.

Chemistry

Chemistry 211 or 207 is required for all students.

Chemistry 211 is a course designed for students who do not intend any further study in chemistry and may be taken either in the fall or spring of the freshman year.

In general, students intending to affiliate with the following departments and schools should take Chemistry 211: electrical engineering, operations research and industrial engineering, computer science, mechanical and aerospace engineering, applied and engineering physics (applied and engineering physics students should discuss this option with the field consultant), and civil engineering (not students in environmental engineering). Students in chemical engineering must take Chemistry 207 in the fall of their freshman year. All students considering environmental engineering, materials science and enginering, geology, or a health-related career such as medicine should take Chemistry 207.

Freshman Writing Seminars

Each semester of their freshman year, students choose a freshman writing seminar from among more than seventy courses offered by over twenty different departments in the humanities, social sciences, and expressive arts. These courses offer the student practice in writing English prose. They also assure beginning students the benefits of a small class.

Technical Writing

In addition to the two Freshman Writing Seminars required, engineering students entering in the fall of 1990 or later and transfer students matriculating in the fall of 1992 or later. Must take a course that includes a significant amount of technical and scientific writing. This course may be used to satisfy another graduation requirement. A student can fulfill the technical writing requirement by enrolling in an engineering course specifically designed to include a writing-intensive component or by taking a course in technical or scientific writing. Courses that satisfy this requirement are A&EP 264, ELE E 315, ENGRC 350, ENGRC 435, and M&AE 427. Additional courses are being reviewed. Updated information on these approved courses may be obtained from Engineering Advising, 167 Olin Hall.

Computing

In either the first or second term of their freshman year, students normally take COMS 100, Introduction to Computer Programming. Before graduation they must take an additional course with a significant amount of computing applications; this course may also be used to meet another graduation requirement. Courses that satisfy this requirement are ABEN 475, COM S 212, ENCRD 211, EBGRD 222, ENGRD 241, ENGRD 264, ELE E 423, ELEE 524, M&AE 389, M&AE 489, M&AE 575, M&AE 578, and M&AE 670. The recommended choice for students intending to enter the Field Program in Engineering Physics is ENGRD 264; in Chemical Engineering, ENGRD 222 or 241; in Computer Science, ENGRD 211 or COM S 212; in Electrical Engineering, ENGRD 211; in Civil Engineering, ENGRD 241; in Mechanical Engineering, M&AE 389, M&AE 489, M&AE 575, or M&AE 670; and in Operations Research and Engineering, ENGRD 211.

Engineering Distribution

Four engineering distribution courses (12 credits) are required. These courses must be selected from four of the eight areas listed below. A student may use only one of the possible substitutions described.

1) *Introduction to engineering*

Several courses are offered to introduce freshmen to the various fields of engineering. Some of these courses, which begin with ENGRI 110, may not be included in this announcement. A full listing will be available in the Course and Room Roster at the time of registration.

2) *Scientific computing*

ENGRD 211, Computers and Programming
ENDGRD 222, Introduction to Scientific Computing
ENGRD 241, Engineering Computation

Students in the Field Program in Computer Science may substitute COM S 212 for Engr 211 (also COM S 211).

3) *Materials science*

ENGRD 261, Introduction to Mechanical Properties of Materials
ENGRD 262, Introduction to Electrical Properties of Materials

4) *Mechanics*

ENGRD 202, Mechanics of Solids
ENGRD 203, Dynamics

Students in the Field Program in Engineering Physics may substitute A&EP 333 for Engr 203.

5) *Probability and statistics*

ENGRD 260, Introduction to Engineering Probability
ENGRD 270, Basic Engineering Probability and Statistics

Students in the Field Program in Electrical Engineering may substitute ELE E 310 for ENGRD 260. Students in the Field Program in Engineering Physics may substitute ELE E 310 or Mathematics 471 for ENGRD 260. Students in the Field Programs in Civil Engineering and Agricultural Engineering may substitute CEE 304 for ENGRD 270.

6) *Electrical sciences*

ENGRD 210, Introduction to Electrical Systems
ENGRD 230, Introduction to Digital Systems
ENGRD 264, Computerized-Instrumentation Design

7) *Thermodynamics and energy balances*

ENGRD 219, Mass and Energy Balances
ENGRD 221, Thermodynamics

Students in the Field Program in Electrical Engineering may substitute ELE E 480 for Engr 221.

8) *Earth and life sciences*

ENGRD 201, Introduction to the Physics and Chemistry of the Earth

Liberal Studies Distribution

The six required liberal studies courses (totaling at least 18 credits) are chosen from approved courses in three categories: (a) humanities or history, (b) social sciences, and (c) expressive or language arts.

At least three courses and a minimum of 9 credits must be chosen from category (a). The remaining three courses may be chosen from categories (a), (b), or (c); however, no more than 4 credits may be chosen from category (c). One-credit courses are acceptable only in category (c). Furthermore, in satisfying the liberal studies requirement, the courses selected must provide both breadth and depth, and not be limited to a selection of unrelated introductory courses. This means inclusion of: at least two courses from the same field, one of which is the explicit prerequisite for the other; **or** two related courses in the same field, at least one of which is numbered 300 or above (250 or above in the field of history).

a) Humanities or History

This category includes all courses (except English 285, Archaeology 285, Art 372, and Philosophy 100) designated by the College of Arts and Sciences as humanities and history (see Distribution Requirement section, group 2b and group 3a; disregard the phrase "Any two") as well as the following:

College of Agriculture and Life Sciences: Communication 316, Education 472, 473

College of Architecture, Art, and Planning: any course in architectural history except freshman seminars

College of Arts and Sciences: Anthropology 355, 356; Economics 315, 326; Government 328, 483; History of Art, all courses numbered 200 and above; Music, all courses listed as introductory (except 120), music theory, and music history; Theatre Arts, only history, literature, and theory courses (performance courses are not acceptable)

College of Engineering: ENGRG 250, 292

School of Industrial and Labor Relations: 100, 101, 140, 304, 305, 381, 384, 430, 448, 502

b) Social Sciences

This category includes all courses designated by the College of Arts and Sciences as social sciences (see Distribution Requirement section, group 2a; disregard the phrase "Any two") as well as the following:

College of Agriculture and Life Sciences: Agricultural Economics 252, 332; Communication 116, 120, 314, 416; Education 210, 211, 212, 271, 310, 311, 317, 378, 477; Natural Resources 201, 407; Rural Sociology, all courses

College of Architecture, Art, and Planning: Architecture 342; City and Regional Planning 218, 400, 404, 413, 414

College of Arts and Sciences: Economics, all courses except 105, 315, 317, 318, 319, 320, 326. Engineering students should generally take Economics 203–204 and not 101–102 unless they have no calculus background.

College of Engineering: ENGRG 321, 322, 360, 400

College of Human Ecology: Consumer Economics and Housing 110, 111, 247, and any courses having these as a prerequisite; Design and Environmental Analysis 150, 250; Human Development and Family Study, all courses except 242, 243; Human Service Studies, all courses; Textiles and Apparel 245

School of Industrial and Labor Relations: All courses except: courses listed under category a); all courses in Economic and Social Statistics; Personnel and Human Resource Management 266; Interdepartmental Course 452

c) Expressive or Language Arts

This category includes all courses defined by the College of Arts and Sciences as expressive arts (see Distribution Requirement, group 3b) as well as the following:

College of Agriculture and Life Sciences: Communication, all courses; Floriculture, any course in freehand drawing and scientific illustration

College of Architecture, Art, and Planning: Art, all courses

College of Arts and Sciences: all nonliterature language courses and all music and theater arts courses that emphasize performance, acting, producing, or directing

College of Engineering: ENGRC 301, 350

College of Human Ecology: Design and Environmental Analysis 101, 111, 114

Division of Biological Sciences: Biological Sciences 209

School of Industrial and Labor Relations: Interdepartmental Course 452

Electives

There are three kinds of electives: approved, free, and technical. Approved electives must be an appropriate part of an overall educational plan or objective.* This constraint allows flexibility for individual goals while maintaining a coordinated program. A free elective may be any course in the university,† although all course selections must be approved by the student's faculty adviser. Technical electives are generally taken in the junior and senior years. They are usually upper-level courses in engineering, mathematics, or the physical sciences, but they also may be courses in other areas as designated by the student's field program.

Approved electives can help develop the skills of a broadly educated engineer, so students should give serious thought to their educational objectives and not propose approved-elective courses haphazardly. Advisers generally accept as approved electives: one introduction to engineering course, engineering distribution courses, courses stressing oral or written communication, upper-level engineering courses, advanced courses in mathematics, and rigorous courses in the biological and physical sciences. Courses in business, economics, and language are often approved by advisers when they serve a student's educational and academic objectives. In other cases, the student's interests are better served by approved electives that expand the field program or other parts of the curriculum, including the humanities and social sciences requirement.

*No ROTC courses may be used as approved electives unless they are co-listed by an academic department.

†Except supplementary courses and ROTC courses at the 100 and 200 level not colisted by an academic department. Up to 6 credits of ROTC courses at the 300 level or above may be used as free electives.

Additional ROTC courses not co-listed by an academic department may not be used to meet graduation requirements.

Social Issues of Technology

It is important for engineers to realize the social and ethical implications of their work. Consequently, in selecting their humanities, social sciences, approved electives, and free electives, students are urged to consider courses listed within the "Science, Technology, and Society" undergraduate area of concentration (see Interdisciplinary Centers and Programs section). These courses may provide students with an important perspective on their studies and their future careers.

Engineering Advising Office

From the time that students enter the college as freshmen until they become affiliated with a major field or the College Program, they are under the administration of the Engineering Advising office, which implements the academic policies of the College Curriculum Governing Board. The office also offers general advising and counseling services, publishes a college newsletter, and serves as the primary resource center for undergraduate students in the college. The Engineering Minority Programs office provides additional specialized services.

To remain in good standing, students in the College of Engineering must affiliate with a field by the end of their sophomore year. Transfer students from outside Cornell usually affiliate with a field of study on matriculation.

Freshman Year

At the end of the freshman year, students are expected to have completed or received credit for at least nine courses, including Math 191, Math 192, Chemistry 211 or 207, Physics 112, COM S 100, two terms of Freshman Writing Seminars, and one engineering-distribution course. In addition, students need to complete two terms of physical education during their first year. *Many variations in the freshman schedule are possible*, depending on the individual student's background, advanced placement credit, and career goals. Those receiving advanced placement for first term calculus may take Physics 112 in term one. Students with an interest in bioengineering may take biology in terms one and two as approved electives. Students preparing to study medicine should take one year of biology and Chemistry 207 and 208 in the first year.

Field Program

The specific program for each field is described in the following pages. Students with a grade-point average of at least 2.0 who are making normal progress toward their degree must affiliate with a field program by the end of their sophomore year. Students who intend to enter the Field Program in Chemical Engineering should take Chemistry 208, Chemistry 389, and Chemistry 290 as approved electives in terms two, three, and four, and Chemistry 390 as a field course in term four. Students intending to major in mechanical engineering must take ENGRD 203, and should also complete ENGRD 221 in their sophomore year. Students in agricultural and biological engineering must take ABEN 250 as a field course in term three. Students intending to major in computer science must take COM S 280 as a field course in term three or four. Students who intend to enter the Field Program in Electrical Engineering **must** earn grades of at least C in Math 293 and 294, at least C in Physics 213 and 214, and at least C+ in ENGRD 210.

Some fields require a specific engineering distribution course as a prerequisite for the upperclass course sequence. These requirements are:

Chemical Engineering: ENGRD 219

Civil Engineering: ENGRD 202

Computer Science: ENGRD 211 (or COM S 212)

Electrical Engineering: ENGRD 210

Materials Science and Engineering: ENGRD 261

Mechanical Engineering: ENGRD 202

Operations Research and Engineering: ENGRD 260

College Program

Individually arranged courses of study under the College Program are possible for those well-qualified students whose educational objectives cannot be met by one of the regular field programs. Often the desired curriculum is in an interdisciplinary area. Each program is developed by the student in consultation with faculty advisers and must be approved by the College Program Committee, which is responsible for supervising the student's work.

Students apply to enter the College Program early in the second term of the sophomore year. A student should seek assistance in developing a coherent program from professors in the proposed major and minor subject areas. If approved, the program is the curricular contract to which the student must adhere. Normally, students applying to the College Program should have a 3.0 cumulative grade point average.

Every curriculum in the College Program, with the exception of certain faculty-sponsored programs, must comprise an engineering major and an educationally related minor. The major may be in any subject area offered by schools or departments of the college; the minor may be in a second engineering subject area or in a logically connected nonengineering area. The combinations must clearly form an engineering education in scope and in substance and should include engineering design and synthesis as well as engineering sciences. In addition to 42 credits in the major and minor subjects, including at least 21 credits in engineering courses, each program includes the normally required courses in humanities and social sciences and free electives.

Further information about the College Program may be obtained from the associate dean for undergraduate programs, 223 Carpenter Hall.

International Programs

An international perspective, sensitivity to other cultures, and the ability to speak a second language are increasingly important to today's engineers. The College of Engineering encourages students to study or work abroad during their undergraduate years to prepare for participation in the global marketplace. A special International Scholars College Program is available for students to minor in international studies and study abroad during their junior year. As with other College Programs (see above), students apply early in the second semester of their sophomore year. For further information on the International Scholars College Program and study or work abroad, contact Professor Richard Lance, 322 Thurston Hall; telephone: 255-5064. Information on co-op programs abroad is available from the Engineering Co-op Office in 105 Hollister Hall.

Dual Degree Option

A special academic option, intended for superior students, is the dual degree program, in which both a Bachelor of Science and a Bachelor of Arts degree can be earned in about five years. Students registered in the College of Engineering or the College of Arts and Sciences may apply and, after acceptance of their application, begin the dual program in their second or third year. Those interested should contact the coordinator of dual degree programs, 172 Goldwin Smith Hall; the associate dean for undergraduate programs in 223 Carpenter Hall; or an adviser in Engineering Advising, 167 Olin Hall.

Double Major in Engineering

Another program that is attractive to many students is the double major. This option, which makes it possible to develop expertise in two allied fields of engineering, generally requires at least one semester beyond the usual four years. Students affiliate with one field in the normal way and then petition to enter a second field before the end of their junior year. All the requirements of both fields must be satisfied. Further information is available from Engineering Advising, 167 Olin Hall, and the individual field consultant offices.

Engineering Communications Program

The ability to communicate effectively is an essential aspect of successful professional practice. The Engineering Communications Program offers instruction in written, oral, and visual presentation. Engineering Communications 350, a three-credit seminar course, is designed for students who desire intensive work in these areas. Examples from real-life engineering contexts are analyzed, and many specific assignments are presented as professional case studies. Students learn to address audiences having different levels of technical expertise and to investigate the social and ethical implications of written and oral communication. Engineering 350 fulfills the college's technical writing requirement (see Requirements for Graduation). The program periodically offers courses on special topics of interest, such as Writing for Engineering Managers (ENGRC 435). In addition to offering courses in professional communications, the program works with engineering courses that include an intensive writing component. The program also maintains a writing-resources library, advises the staff of the *Cornell Engineer*, facilitates writing-prize competitions, and arranges discussions of professional communications with students and alumni. For further information, contact the director, 205 Carpenter Hall.

Engineering Cooperative Program

A special program for undergraduates in most fields of engineering is the Engineering Cooperative Program, which provides an opportunity for students to gain practical experience in industry and other engineering-related enterprises before they graduate. By supplementing course work with carefully monitored, paid jobs, co-op students are able to explore their own interests and acquire a better understanding of engineering as a profession.

Sophomores in the upper half of their class are eligible to apply for the co-op program. (Students in computer science and agricultural engineering are eligible, even though they may not be registered in the College of Engineering.) Applicants are interviewed by representatives of cooperating companies and select their work assignments from any offers they receive. Those students who are offered assignments and elect to join the program usually take their fifth-term courses at Cornell during the summer following their sophomore year and begin their first co-op work assignment that fall. They return to Cornell to complete term six with their classmates and then undertake a second work assignment with the same company the following summer. Co-op students return to campus for their senior year and graduate with their class.

Further information may be obtained from the Engineering Cooperative Program office, 105 Hollister Hall.

MASTER OF ENGINEERING DEGREE PROGRAMS

One-year Master of Engineering (M.Eng.) programs are offered in thirteen fields. These programs are discussed in this announcement in connection with the corresponding upperclass engineering field programs because the curricula are integrated. Cornell baccalaureate engineering graduates frequently continue their studies in the M.Eng. program, although the program is also open to qualified graduates of other schools. The M.Eng. degrees and the academic fields under which they are described are listed below.

M.Eng.(Aerospace): Mechanical and aerospace engineering

M.Eng.(Agricultural and Biological): Agricultural and biological engineering

M.Eng.(Chemical): Chemical engineering

M.Eng.(Civil & Environmental): Civil and environmental engineering

M.Eng.(Computer Science): Computer sciences

M.Eng.(Electrical): Electrical engineering

M.Eng.(Engineering Physics): Applied and engineering physics

M.Eng.(Geology): Geological sciences

M.Eng.(Materials): Materials science and engineering

M.Eng.(Mechanical): Mechanical and aerospace engineering

M.Eng.(Engineering Mechanics): Theoretical and Applied Mechanics

M.Eng.(Nuclear): Nuclear science and engineering

M.Eng.(OR&IE): Operations research and industrial engineering

Candidates for a professional master's degree who wish to specialize in areas related to manufacturing may avail themselves of two special programs. The manufacturing systems engineering option may be centered in any one of the fields listed above. The microelectronics manufacturing option is offered in the fields of electrical engineering, engineering physics, materials science and engineering, and chemical engineering. Both specializations are attested to by a Dean's Certificate in addition to a diploma at the time of graduation. An industrial internship program provides opportunities to combine on-campus education with off-campus industrial experience.

An M.Eng. option of potential interest to engineers from all fields is the program in engineering management, offered by the School of Civil and Environmental Engineering. This option is described in the section related to the M.Eng.(Civil & Environmental) degree. A new management option in the M.Eng.(Chemical) degree program is also available.

Cornell engineering graduates in the upper half of their class will generally be admitted to M.Eng. programs; however, requirements for admission vary by field. Superior Cornell applicants who will be, at the time of matriculation, eight or fewer credits short of a baccalaureate degree may petition for early admission. Other applicants must have a baccalaureate degree or its equivalent from a college or university of recognized standing, in an area of engineering or science that is judged appropriate for the proposed field of study. They must also present evidence of undergraduate preparation equivalent to that provided by a Cornell undergraduate engineering education, a transcript, two letters of recommendation, and a statement of academic purpose. A candidate who is admitted with an undergraduate background that is judged inadequate must make up any deficiencies in addition to fulfilling the regular course requirements for the degree. Applicants from foreign universities must submit the results of the Graduate Record Examination aptitude tests and must have an adequate command of the English language. Financial aid providing partial support is available for very highly qualified candidates, primarily those who are residents of the U.S. Industry-sponsored internships, which extend the program to two years, are also available to residents of the United States. Application forms and further information are available from the Master of Engineering Office, 148 Olin Hall.

Cooperative Programs with the Johnson Graduate School of Management

Two programs culminate in both Master of Engineering and Master of Business Administration degrees. One, which Cornell students enter during their undergraduate career, makes it possible to earn the B.S., M.Eng., and M.B.A. in six years—one year less than such a program would normally require. The second program, which is available to students who already hold baccalaureate degrees from Cornell or other institutions, requires five semesters and leads to both the M.Eng. and M.B.A. Another program allows the Cornell engineering undergraduate to earn the B.S. and M.B.A. degrees in five years.

Undergraduate students at Cornell interested in the six-year program should seek advice and information from the department with whose field they intend to affiliate during their upperclass years. Information about admission to either program and about special scholarship aid may be obtained from the Master of Engineering Office, 148 Olin Hall.

ACADEMIC PROCEDURES AND POLICIES

Advanced Placement Credit

The College of Engineering awards a significant amount of advanced placement (AP) credit to entering freshmen who demonstrate proficiency in the subject areas of introductory courses. Students may qualify for AP credit in one of two ways:

1) by receiving sufficiently high scores on advanced placement examinations given and scored by the College Entrance Examination Board (CEEB); or
2) by receiving sufficiently high scores on Cornell's departmental placement examinations, which are given during orientation week before fall-term classes begin. Advanced placement is granted only to first-term freshmen, and the placement examinations are scored before the students begin classes.

Advanced placement credit is intended to permit students to develop more challenging and stimulating programs of study. Students who receive AP credit for an introductory course may use it in three different ways.

1) They may enroll in a more advanced course in the same subject right away.
2) They may substitute an elective course from a different area.
3) They may enroll in fewer courses, using the AP credit to fulfill basic requirements.

A detailed description of the college's policies concerning advanced placement credit and its use in developing undergraduate programs may be found in the pamphlet *Advanced Placement and Transfer Credit for First-Year Engineering Students*, which may be obtained from Engineering Advising, 167 Olin Hall.

Transfer Credit

Entering freshmen and entering transfer students who have completed courses at recognized and accredited colleges may, under certain conditions, have credits for such courses transferred to Cornell. Such courses must represent academic work in excess of that required for the secondary school diploma. Courses deemed acceptable for transfer credit must be equivalent in scope and rigor to courses at Cornell.

College courses completed under the auspices of cooperative college and high school programs will be considered for advanced placement credit if students demonstrate academic proficiency by taking the appropriate CEEB or Cornell departmental placement examination, as described above.

After matriculation no more than 9 credits of transfer or Cornell extramural credit may be used to satisfy bachelor's degree requirements. Summer session courses at Cornell are the only exception to this rule.

A more detailed description of the college's regulations governing transfer credit may be found in the *Engineering Student Handbook*, available from Engineering Advising, 167 Olin Hall.

Academic Standing

The requirements for good standing in the college vary slightly among the different divisions. First-term freshmen must have a grade point average of 1.7 or higher with no failing, unsatisfactory, or *incomplete* grades; must attain a minimum grade of C– in their common curriculum mathematics course; and must be making adequate progress toward the degree. Second-term freshman and sophomore requirements are the same, except that the grade-point average must be at least 2.0. Upperclass requirements for good standing, graduation, and for satisfactory performance in courses that are prerequisite for field courses vary slightly for different fields of study, as specified in the following sections, the *Engineering Student Handbook*, or student handbooks prepared by the individual schools and departments.

Dean's List

Dean's List citations are presented each semester to engineering students with exemplary academic records. The criteria for this honor, which are determined by the dean of the college, are a term average of 3.25 or higher with no failing, unsatisfactory, or *incomplete* grades (even in physical education) and 12 credits or more of **letter grades**. Students may earn Dean's List status retroactively if they meet these criteria after making up incompletes according to college rules.

S-U Grades

The option of receiving a grade of "satisfactory" or "unsatisfactory" (S-U) in a particular course, rather than a grade on a graduated scale, may be selected only in the following circumstances. Students who want to take a course on an S-U basis must have completed at least one full semester of study at Cornell, and they may take only one course per semester on an S-U basis. Only courses in the humanities and social sciences, approved electives, and free electives may be taken as S-U courses. Students may preregister for the S-U option. To change a grading option, a properly completed and approved add/drop form must be filed with the registrar of the College of Engineering by the end of the first three weeks of the semester. After this deadline, the grading option *may not be changed under any circumstances* and no courses may be added with the S-U option selected.

The S-U policy does not apply to courses in physical education and other courses that are not taken to fulfill degree requirements. When a particular course is offered **only** on an S-U basis, a student may petition to take a second S-U course in the same term.

Residence Requirements

Candidates for an undergraduate degree in engineering must spend at least four semesters or an equivalent period of instruction as full-time students at Cornell. They must also spend at least three semesters of this time affiliated with an engineering field program or with the College Program.

Students who are voluntarily not enrolled at Cornell as full-time students may take individual courses through the Extramural Division. Students who have been asked to take time off are permitted to register for courses extramurally only with the approval of their field (or the college, for unaffiliated students). No more than 9 credits earned through study in the Extramural Division or acquired as transfer credit (or a combination thereof) may be used to satisfy the requirements for the bachelor's degree in engineering.

Degree candidates may spend periods of time studying away from the Cornell campus with appropriate authorization. Such students must register for study in absentia and pay a fee. Information on programs sponsored by other universities and on procedures for direct enrollment in foreign universities is available at the Cornell Abroad office, 474 Uris Hall. Programs should be planned in consultation with Professor Richard Lance, 322 Thurston Hall, or with the staff of Engineering Advising, who can provide information on credit-evaluation policies and assist in the petitioning process. For more information consult the *Engineering Student Handbook*.

Transferring within Cornell

It is not uncommon for students to change their academic or career goals after matriculation in one college and decide that their needs would be better met in another college at Cornell. While transfer between colleges is not guaranteed, efforts are made to assist students in this situation.

Students who wish to transfer into the College of Engineering can make application to the Office of Engineering Admissions—application forms are available in the Carpenter Hall Annex. Students who would enter the college as second-semester sophomores or upperclassmen must be accepted by a field program as part of the admission process. Others may be accepted into the college without the requirement of field affiliation.

Students who hope to transfer into engineering should take courses in mathematics, chemistry, computer science, and physics that conform to the requirements of the Common Curriculum. Interested students should discuss their eligibility with an adviser in Engineering Advising, 167 Olin Hall.

Leave of Absence and Withdrawal

Students may interrupt their studies for a period of time by taking a leave of absence. A formal petition must be filed, an exit interview conducted, and written approval granted. Leaves of absence are granted for a *minimum* of six months, and can be granted for a period or up to two years. Credit earned while on leave of absence is subject to the limitation placed on extramural and transfer credit.

Students who voluntarily *withdraw* from the engineering degree program sever all connection with the college, and if they subsequently want to return, they must make a formal application for readmission. Students who fail to register in the first three weeks of the semester, without having received a leave of absence or permission for study in absentia, may be classified, by action of the faculty, as having withdrawn.

ENGINEERING CAREER SERVICES

Individual advising and group seminars are available for students who desire assistance in career and job-search matters. Also, interviews are arranged between students and more than 250 national companies that visit the campus to recruit technical graduates. This service, available to both undergraduates and graduates, can be used to find permanent or summer employment. A résumé referral service is available to engineering alumni. Further information on all services is available from the Office of Engineering Placement, 201 Carpenter Hall (255–5006).

AGRICULTURAL AND BIOLOGICAL ENGINEERING

R. B. Furry, chair; L. D. Albright, D. J. Aneshansley, J. A. Bartsch, J. R. Cooke, A. K. Datta, R. C. Derksen, K. G. Gebremedhin, W. W. Gunkel, D. A. Haith, J. B. Hunter, L. H. Irwin, W. J. Jewell, D. C. Ludington, J.-Y. Parlange, R. E. Pitt, G. E. Rehkugler, N. R. Scott, T. S. Steenhuis, M. B. Timmons, L. P. Walker, M. F. Walter

Bachelor of Science Curriculum

The Field Program in Agricultural and Biological Engineering prepares students for engineering practice in biological and physical systems represented in agriculture and its supporting industries and agencies, environmental or resource protection agencies, the biotechnological industries, international engineering, and the food industries. Engineering is applied to production, storage, processing, distribution, and use of plant and animal products and biomass. Issues of environmental quality and safety and preservation of soil, water, and energy resources are important. Emerging areas of study include engineering aspects of biotechnology and animal and human health. Biological sciences are integrated into the field program along with engineering design and studies in the physical sciences. Areas of concentration include agricultural engineering, biological engineering, environmental systems, and food engineering.

The program is jointly administered by the College of Engineering and the College of Agriculture and Life Sciences. Students are enrolled only in the College of Agriculture and Life Sciences during their first four semesters and jointly in the College of Engineering in the remaining semesters. Engineering college tuition is required for one year and is typically paid during the fifth and sixth semesters of study. Additional information about the program may be found in the section on the College of Agriculture and Life Sciences in this publication.

Graduates find employment not only in agricultural and food-related industries but also in environmentally related firms and agencies, and the health industries. Many graduates pursue a professional (Master of Engineering) or research (Master of Science or doctoral) degree. Agricultural and biological engineers are employed in private industry, consulting firms, government agencies, utility companies, and educational institutions. The unique blend of engineering and the biological sciences and the breadth of education of the agricultural and biological engineer is often attractive to employers.

For further details see the department's undergraduate programs publication, available at 206 Riley-Robb Hall, or contact the field's Coordinator of Instruction at 255–2483.

The field program requirements are outlined below.

Basic Subjects	*Credits*
Math 191, 192, 293, 294, Calculus for Engineers and Engineering Mathematics	16
Chem 211, General Chemistry, or equivalent	4
Phys 112, 213, 214, Physics I, II, and III	12

(organic chemistry or biochemistry may be substituted for Physics 214)	
Introductory biological sciences	6 or 8
ABEN 151, Introduction to Computer Programming	4
ABEN 200, Undergraduate Seminar	1
Engineering distribution (four courses, including Mechanics of Solids and Thermodynamics)	12
Humanities and social sciences (eight courses, including two in written expression, one in communications, and a minimum of 9 credits in humanities and/or history)	24
Advanced and Applied Subjects	
Engineering sciences in any field (must include fluid mechanics and dynamics), plus ABEN 250 and 350 and a minimum of three agricultural and biological engineering courses (at least 9 credits) chosen from courses numbered 450 to 496	33
Biological or agricultural sciences (at least 3 credits of biological sciences beyond the introductory level)	12
Free electives	6
Total	129

Master of Engineering (Agricultural and Biological) Degree Program

The program for the M.Eng.(Agricultural and Biological) degree is intended primarily for those students who plan to enter engineering practice. The curriculum is planned as an extension of the Cornell undergraduate program in agricultural and biological engineering but can accommodate graduates of other engineering disciplines. The curriculum consists of 30 credits of courses intended to strengthen the students' fundamental knowledge of engineering and develop their design skills. Six of the required 30 credits are earned for an engineering design project that culminates in a written and oral report.

A candidate for the M.Eng.(Agricultural and Biological) degree may choose to concentrate in one of the subareas of agricultural and biological engineering or take a broad program without specialization. The subareas are (a) agricultural engineering, (b) biological engineering, (c) environmental systems, and (d) food engineering. Engineering electives are chosen from among subject areas relevant to agricultural and biological engineering, such as thermodynamics, heat transfer and fluid mechanics, process engineering, mechanical design and analysis, theoretical and applied mechanics, structural engineering, hydraulics, environmental engineering, soil engineering, waste management and treatment, machine vision, and sensor technology.

APPLIED AND ENGINEERING PHYSICS

R. A. Buhrman, director; M. S. Isaacson, associate director; B. W. Batterman, D. H. Bilderback, J. D. Brock, K. B. Cady, D. D. Clark, T. A. Cool, H. G. Craighead, H. H. Fleischmann, E. J. Kirkland, V. O. Kostroun, B. R. Kusse, R. L. Liboff, R. V. E. Lovelace, M. S. Nelkin, T. N. Rhodin, J. Silcox, R. N. Sudan, W. W. Webb, F. W. Wise, G. J. Wolga

Bachelor of Science Curriculum

The undergraduate engineering physics curriculum is designed for students who want to pursue careers of research or development in applied science or advanced technology and engineering. Its distinguishing feature is a focus on the physics and mathematics fundamentals, both experimental and theoretical, that are at the base of modern engineering and research and have a broad applicability in these areas. By choosing areas of concentration, the students may combine this physics base with a good background in a conventional area of engineering or applied science.

The industrial demand for graduates with baccalaureates is high, and many students go directly to industrial positions where they work in a variety of areas that either combine, or are in the realm of, various more conventional areas of engineering. Recent examples include bioengineering, computer technology, electronic-circuit and instrumentation design, energy conversion, geological analysis, laser and optical technology, microwave technology, nuclear technology, software engineering, and solid-state-device development. A number of our graduates go on for advanced study in all areas of basic and applied physics, as well as in a diverse range of areas in advanced science and engineering. Examples include applied physics, astrophysics, atmospheric sciences, biophysics, computer science and engineering, electrical engineering, environmental science, fluid mechanics, geotechnology, laser optics, materials science and engineering, mechanical engineering, medical physics, mathematics, medicine, nuclear engineering, oceanography, and physics. The undergraduate program can also serve as an excellent preparation for medical school, business school, or specialization in patent law.

The engineering physics program fosters this breadth of opportunity because it both stresses the fundamentals of science and engineering and gives the student direct exposure to the application of these fundamentals. Laboratory experimentation is emphasized, and ample opportunity for innovative design is provided. Examples are A&EP 110, The Laser and Its Applications in Science, Technology, and Medicine (a freshman course); A&EP 264, Computerized-Instrumentation Design (a sophomore course); A&EP 363, Electronic Circuits (a junior course); Physics 410, Advanced Experimental Physics; A&EP 436, Physical and Integrated Optics (senior courses); and A&EP 438, Computational Engineering Physics (a senior computer laboratory).

Undergraduates who plan to enter the Field Program in Engineering Physics are advised to arrange their Common Curriculum with their developing career goals in mind. Students are also encouraged to take Physics 112 or Physics 116 during their first semester (if their advanced placement credits permit) and to satisfy the computing applications requirement with an engineering distribution course such as A&EP 264. Engineering physics students need to take only three engineering distribution courses, since A&EP 333, which they take in their junior year, counts as a fourth member of this category.

The upperclass course requirements of the field program are as follows:

Course	*Credits*
A&EP 333, Mechanics of Particles and Solid Bodies	4
A&EP 355, Intermediate Electromagnetism	4
A&EP 356, Intermediate Electrodynamics	4
A&EP 361, Introductory Quantum Mechanics	4
A&EP 363, Electronic Circuits	4
A&EP 423, Statistical Thermodynamics	4
A&EP 434, Continuum Physics	4
Physics 410, Advanced Experimental Physics	4
A&EP 321, Mathematical Physics I; Mathematics 421; or T&AM 610 (applied mathematics)	4
A&EP 322, Mathematical Physics II; Mathematics 422; or T&AM 611 (applied mathematics)	4
Applications of quantum mechanics*	3 or 4
A third technical elective (in addition to the two required by the Common Curriculum)†	3

*Some courses that will satisfy this requirement are Physics 444, Nuclear and High-Energy Particle Physics; Physics 454, Introductory Solid-State Physics; A&EP 436, Physical and Integrated Optics; A&EP 609, Low-Energy Nuclear Physics; ELE E 430, Lasers and Optical Electronics; and ELE E 531, Quantum Electronics I.

†If a scientific computing course was not selected as an engineering distribution course, one of these technical electives may be needed to satisfy the computing applications requirement. For students going on to graduate school a third course in mathematics is recommended.

Areas of concentration. With at least five electives in the junior and senior years, students are encouraged to develop areas of concentration in accordance with their individual career goals and interests. For those who look toward an industrial position after graduation, these electives should be chosen to widen the necessary background in a specific area of practical engineering. A different set of electives could be selected as preparation for medical, law, or business school. For students who plan on graduate studies, the electives provide an excellent opportunity to explore upper-level and graduate courses. Various programs are described in a special brochure available from the School of Applied and Engineering Physics, Clark Hall. Students interested in such programs are advised to consult with a professor active in their area or with the associate director of the school, Professor Michael S. Isaacson.

Electives need not be all formal course work: Qualified students may undertake informal study under the direction of a member of the faculty (A&EP 490). This may include

research or design projects in areas in which faculty members are active. While free electives may be selected (with the permission of the faculty adviser) from among almost all the courses offered at the university, the student is encouraged to select those that will provide further preparation in the area of technical interest. The minimum requirement is two courses or six credits.

The variety of course offerings provides a sizable flexibility in scheduling. In addition, if scheduling conflicts arise, the school may allow substitution of courses nearly equivalent to the listed required courses: Physics 325–326 is similar to A&EP 355–356; Physics 318 (offered in the spring) and T&AM 570 are similar to A&EP 333; Physics 443 (offered in the fall), is similar to A&EP 361; and advanced courses in fluid mechanics or elasticity are similar to A&EP 434.

The Engineering Physics program requires a minimum GPA of 2.7 in all physics and mathematics courses before entering the Engineering Physics field. Once in the field, the engineering physics student is expected to pass every course for which he or she is registered, to earn a grade of C- or better in specifically required courses, and to attain each term an overall grade point average of at least 2.3.

Master of Engineering (Engineering Physics) Degree Program

The M.Eng.(Engineering Physics) degree may lead directly to employment in engineering design and development or may be a basis for further graduate work. Students have the opportunity to broaden and deepen their preparation in the general field of applied physics, or they may choose the more specific option of preparing for professional engineering work in a particular area such as laser and optical technology, microstructure science and technology, device physics, or materials characterization. A wide latitude is allowed in the choice of the required design project.

One example of a specific area of study is solid-state physics and chemistry as applied to microstructure science and technology. Core courses in this specialty include the microcharacterization of materials (A&EP 661) and the microprocessing and microfabrication of materials (A&EP 662). The design project may focus on such areas as semiconductor materials, device physics, microstructure technology, or optoelectronics.

Each individual program is planned by the student in consultation with the program chair. The objective is to provide a combination of a good general background in physics and introductory study in a specific field of applied physics. Candidates may enter with an undergraduate preparation in physics, engineering physics, or engineering. Those who have majored in physics usually seek advanced work with an emphasis on engineering; those who have majored in an engineering discipline generally seek to strengthen their physics base. Candidates coming from industry usually want instruction in both areas. All students granted the degree will have demonstrated competence in an appropriate core of basic physics; if this has not been accomplished at the undergraduate level, subjects such as electricity and magnetism, or classical, quantum, and statistical mechanics should be included in the program.

The general requirement for the degree is a total of 30 credits for graduate-level courses or their equivalent, earned with a grade of C or better and distributed as follows:

1) a design project in applied science or engineering (not less than 6 nor more than 12 credits)
2) an integrated program of graduate-level courses, as discussed below (14 to 20 credits)
3) a required special-topics seminar course (4 credits)

The design project, which is proposed by the student and approved by the program chair, is carried out on an individual basis under the guidance of a member of the university faculty. It may be experimental or theoretical in nature; if it is not experimental, a laboratory physics course is required.

The individual program of study consists of a compatible sequence of courses focused on a specific area of applied physics or engineering. It is planned to provide an appropriate combination of physics and physics-related courses (applied mathematics, statistical mechanics, applied quantum mechanics) and engineering electives (such as courses in biophysics, chemical engineering, electrical engineering, materials science, computer science, mechanical engineering, or nuclear engineering). Additional science and engineering electives may be included. Some courses at the senior level are acceptable for credit toward the degree; other undergraduate courses may be required as prerequisites but are not credited toward the degree.

Students interested in the M.Eng.(Engineering Physics) degree program should contact Professor R. V. E. Lovelace.

APPLIED MATHEMATICS

The Center for Applied Mathematics administers a broadly based interdepartmental graduate program that provides opportunities for study and research in a wide range of the mathematical sciences. For detailed information on opportunities for graduate study in applied mathematics, contact the director of the Center for Applied Mathematics, Engineering and Theory Center Building.

There is no special undergraduate degree program in applied mathematics. Undergraduate students interested in application-oriented mathematics may select an appropriate program in the Department of Mathematics or one of the departments in the College of Engineering.

A list of selected graduate courses in applied mathematics may be found in the description of the Center for Applied Mathematics, in the section "Interdisciplinary Centers and Programs."

CHEMICAL ENGINEERING

C. Cohen, director; G. F. Scheele, associate director; A. B. Anton, P. Clancy, T. M. Duncan, J. R. Engstrom, K. E. Gubbins, D. A. Hammer, P. Harriott, D. L. Koch, R. P. Merrill, W. L. Olbricht, A. Panagiotopoulos, F. Rodriguez, M. L. Shuler, P. H. Steen, W. B. Streett, J. A. Zollweg

Bachelor of Science Curriculum

The undergraduate Field Program in Chemical Engineering comprises a coordinated sequence of courses beginning in the sophomore year and extending through the fourth year. Special programs in biochemical engineering and polymeric materials are available. Students who plan to enter the field program take Chemistry 208 as an approved elective during the freshman year. The program for the last three years, for students who have taken two engineering distribution courses during the first year, is as follows:

Term 3	*Credits*
Math 293, Engineering Mathematics	4
Phys 213, Electricity and Magnetism	4
Chem 389, Physical Chemistry (approved elective)	4
CHEME 219 (engineering distribution course)	3
Humanities or social sciences course	3
Term 4	
Math 294, Engineering Mathematics	4
Phys 214, Optics, Waves, and Particles	4
Chem 290–390, Physical Chemistry	6
Engineering distribution course	3
Humanities or social sciences course	3
Term 5	
Chem 253, Organic Chemistry**	4
Chem 251, Organic Chemistry Laboratory	2
CHEME 313, Chemical Engineering Thermodynamics	4
CHEME 323, Fluid Mechanics	3
Humanities or social sciences course	3
Term 6	
Applied Science elective†	3
CHEME 101, Nonresident Lectures	0
CHEME 324, Heat and Mass Transfer	3
CHEME 332, Analysis of Separation Processes	4
CHEME 390, Reaction Kinetics and Reactor Design	3
Humanities or social sciences course	3
Term 7	
CHEME 432, Chemical Engineering Laboratory	4
Electives*	9
Humanities or social sciences course	3
Term 8	
CHEME 462, Chemical Process Design	4
CHEME 472, Process Control	3
Electives*	6
Humanities or social sciences course	3

*The electives in terms seven and eight comprise 6 credits of technical electives, 6 credits of free electives, and 3 credits of CHEME process or systems elective. CHEME process or systems electives include CHEME 564, Design of Chemical Reactors; CHEME 566, Systematic Methods for Process Design; CHEME 640, Polymeric Materials; CHEME 643, Introduction to Bioprocess Engineering; CHEME 656, Separations Using Membranes or Porous Solids; CHEME 661, Air Pollution Control.

**Chemistry 357 may be substituted for CHEM 253. The applied science elective must then be CHEM 358.

†Applied science electives include Biological Sciences 290, General Microbiology Lectures; Biological Sciences 330 and 331, Principles of Biochemistry; CEE 654, Aquatic Chemistry; CHEME 640, Polymeric Materials; CHEME 673, Adsorption and Reactions on Chemically Reactive Solids; Food Science 409, Food Chemistry; MS&E 331, Structure of Materials; MS&E 332, Electrical and Magnetic Properties of Materials; MS&E 441, Microprocessing of Materials; MS&E 449, Introduction to Ceramics; MS&E 452, Properties of Solid Polymers; any A&EP course numbered 333 or above; any Chemistry course numbered 301 or above; any Physics course numbered 300 or above.

Master of Engineering (Chemical) Degree Program

The professional master's degree, M.Eng.(Chemical), is awarded at the end of one year of graduate study with successful completion of 30 credits of required and elective courses in technical fields including engineering, mathematics, chemistry, physics, and business administration. Courses emphasize design and optimization based on the economic factors that affect design alternatives for processes, equipment, and plants. General admission and degree requirements are described in the college's introductory section.

Specific requirements include

1) two courses in advanced chemical engineering fundamentals chosen from CHEME 711, 713, 731, 732, and 751
2) two courses in applied chemical engineering science chosen from CHEME 564, 566, 640, 643, 656, and 661.
3) a minimum of 3 credits of a design project, CHEME 565

Dean's certificate programs in Engineering Management and Energy Engineering are available. A program offered jointly with the Food Science Department is also available, leading to both the Master of Engineering and the Master of Professional Studies degrees.

CIVIL AND ENVIRONMENTAL ENGINEERING

A. H. Meyburg, director; J. R. Stedinger, associate director; J. F. Abel, J. J. Bisogni, Jr., W. H. Brutsaert, G. G. Deierlein, R. I. Dick, P. Gergely, J. M. Gossett, M. D. Grigoriu, D. A. Haith, K. C. Hover, A. R. Ingraffea, G. H. Jirka, F. H. Kulhawy, J. A. Liggett, L. W. Lion, P. L-F. Liu, D. P. Loucks, W. R. Lynn, T. D. O'Rourke, T. Pekōz, W. D. Philpot, M. J. Sansalone, R. E. Schuler, C. A. Shoemaker, H. E. Stewart, M. A. Turnquist, R. N. White

Bachelor of Science Curriculum

The School of Civil and Environmental Engineering offers an accredited undergraduate program in civil engineering. The civil engineering curriculum is designed to ensure adequate depth and breadth in each of the subdisciplines of civil engineering. For students who want to specialize in a particular subdiscipline, illustrative sets of courses are available in the school office (220 Hollister Hall). Students may emphasize structural engineering; civil engineering materials; geotechnical engineering; water quality and hazardous-waste engineering; environmental engineering; environmental management and planning; hydraulics, hydrology and fluid mechanics; and remote sensing.

Students planning to enter the Field Program in Civil Engineering are required to take Mechanics of Solids (Engr 202) during the sophomore year.* Prospective majors are strongly encouraged to obtain a "typical course schedule" from the school office.

For the Field Program in Civil Engineering the following courses are required in addition to those required for the Common Curriculum:†

Courses	*Credits*
Engr 202, Mechanics of Solids	3
Engr 203, Dynamics	3
Engr 261, Introduction to Mechanical Properties of Materials*	3
Engr 241, Engineering Computation††	3
CEE 304, Uncertainty Analysis in Engineering**	4
CEE 323, Engineering Economics and Management	3
CEE 331, Fluid Mechanics	4
CEE 341, Introduction to Geotechnical Engineering	4
CEE 351, Environmental Quality Engineering	3
CEE 361, Introduction to Transportation Engineering	3
CEE 371, Structural Behavior	4
Civil engineering distribution courses	12

Four civil engineering distribution courses must be selected from an approved list, and they must represent at least three of the different areas of civil engineering into which the list is categorized. The list is available at the school office, 220 Hollister Hall.

Civil engineering majors must also take at least two courses selected from a list of approved design courses (also available in 220 Hollister Hall), and must choose as one of their technical electives a 3-or-more-credit upper-level engineering course with design content. These requirements should not make it necessary to add any courses to the field program, although they do constrain the choice of civil engineering distribution courses or electives. Students are expected to complete at least 12 credits each semester with a grade-point average of 2.00 overall, and an average of 2.00 in their civil and environmental engineering courses. No more than one course with a grade below C– may be used to satisfy the requirements of the Civil Engineering field program (which include eleven required courses and four civil engineering distribution courses).

*These courses can also be used to satisfy the Common Curriculum requirements for engineering distribution courses.

†Chem 208 can be substituted for Phys 214.

††Engr 241 can be used to satisfy both the computer application requirement and an engineering distribution requirement of the Common Curriculum.

**Students in Civil Engineering should take CEE 304 instead of Engr 270, applying it toward the engineering distribution requirement if necessary. If this is done, the technical elective requirement is increased by 3 credits. Engr 270 may be accepted (on petition) as a substitute for CEE 304 in the field program, but only if Engr 270 is taken before entry into the field.

Master of Engineering (Civil) Degree Program

The M.Eng. (Civil) degree program is a 30-credit (usually ten-course) curriculum designed to prepare students for professional practice. There are two options in this program: one in civil and environmental engineering design and one in engineering management. Both options require a broad-based background in an engineering field. Applicants holding an ABET-accredited (or equivalent) undergraduate degree in engineering automatically satisfy this requirement. Those without such preparation will require course work beyond the graduate program's 30-credit minimum to fulfill the engineering preparation requirement. Both options also require one course in professional practice and a two-course project sequence. The project entails synthesis, analysis, decision making, and application of engineering judgment. Normally it is undertaken in cooperation with an outside practitioner, and it includes an intensive, full-time, three-week session between semesters. The general degree requirements and admissions information are described above in the section entitled "Master of Engineering Degree Programs." Each student's program of study is designed individually in consultation with an academic adviser and then submitted to the school's Professional Degree Committee for approval.

For the M.Eng. (Civil) program in civil and environmental engineering design options, the requirements are:

1) Three courses, one in professional engineering practice (CEE 503) and a two-course design project (CEE 501 and 502)
2) Specialization in a major—three to five courses in either environmental engineering, environmental and public systems engineering, geotechnical engineering, hydraulic engineering, remote sensing, structural engineering, or transportation engineering
3) Two courses in a single related or minor area
4) Technical electives (up to two courses)

Courses in the minor and electives may consist of graduate or advanced courses in fields related to the major, either inside or outside of the school.

For the M.Eng. (Civil) program in the engineering management option, the requirements are:

1) Four courses: Management Practice (CEE 590), Engineering Management Methods (CEE 593), and the Management Project (CEE 591 and 592)
2) Two courses from a list of engineering management electives
3) Two elective courses in general management from outside the school, including accounting, finance, law and regulation, marketing, and organizational behavior

4) Two engineering and/or technical elective courses

The School of Civil and Environmental Engineering cooperates with the the Johnson Graduate School of Management in two joint programs leading to both Master of Engineering and Master of Business Administration degrees. See the introductory section under College of Engineering.

Applications for the six-year B.S./M.Eng./M.B.A. program must be submitted at the beginning of the sixth term of study.

COMPUTER SCIENCE

J. E. Hopcroft, chair; K. Birman, B. Bloom, T. Coleman, R. L. Constable, B. Donald, D. Gries, J. Hartmanis, T. Henzinger, D. Howe, D. Huttenlocher, D. Kozen, K. Marzullo, P. Pedersen, K. Pingali, G. Salton, F. B. Schneider, A. Segre, D. Subramanian, R. Teitelbaum, C. Tomasi, S. Toueg, N. Trefethan, C. Van Loan, S. Vavasis

Bachelor of Science Curriculum

The Field Program in Computer Science is intended for students who are interested in the computing process and in the fundamental structure of algorithms, data, and languages that underlie that process.

A student entering the Field Program in Computer Science must take COM S 211 or 212 and COM S 280 before beginning the upperclass sequence. Students who do not earn a grade of B– or better in both COM S 211 or 212 and COM S 280 are strongly advised against attempting the computer science field program. Students who have not maintained an average of at least 3.0 in the mathematics courses required by the Common Curriculum are also discouraged from entering the program. Apart from these requisites and those of the college, the courses required for the Field Program in Computer Science are:

Course Work	*Credits*
Systems sequence COM S 314, Systems and Organization COM S 410, Data Structures COM S 414, Systems Programming and Operating Systems	11
Theory sequence COM S 381 or 481, Theory of Computing COM S 482, Analysis of Algorithms	8
Numerical Analysis COM S 222, Scientific Computation, or COM S 421, Numerical Solutions of Algebraic Equations	3–4
Computer science electives	7–9

Two nonrequired computer science courses numbered 400 or above.* One must be a course or course-laboratory combination that includes a substantial programming project—for example, COM S 412–413, 414–415, 417–418, 432–433, 462–463, or 472–473.

Related electives	14–16

One mathematically oriented course plus three courses forming a coherent sequence in mathematics, operations research, electrical engineering, or another technical area.

*Except COM S 413, 415, 418, 433, 463, 473, 600, 601, and seminar courses.

For more information, refer to the *Computer Science Undergraduate Handbook*, available from 303 Upson Hall.

The performance of students in the Field of Computer Science is reviewed each term. To remain in good standing with the department, they must have an overall term average of at least 2.3 with no courses failed and a term average for field program courses of at least 2.7 with no course grade less than C–, and they must be making satisfactory progress in the field.

Cooperative Program with the Johnson Graduate School of Management

Undergraduates majoring in computer science may be interested in a program that can lead, in the course of six years, to B.S., M.Eng.(Computer Science), and M.B.A. degrees. This program, which is sponsored jointly by the College of Engineering and the Johnson Graduate School of Management, enables students to study several subjects required for the M.B.A. degree as part of their undergraduate curriculum. Planning must begin early, however, if all requirements are to be completed on schedule.

For further details, application forms, and assistance in planning a curriculum, students should contact the assistant director of undergraduate programs in Upson Hall.

Master of Engineering (Computer Science) Degree Program

The one-year program leading to the degree of M.Eng.(Computer Science) admits fifteen to twenty students a year. A strong undergraduate background in computer science or a related field is required. Early admission is available for Cornell seniors who apply in the fall semester.

The emphasis of the curriculum can be on programming languages and systems or theory of algorithms and theory of computation or numerical analysis, artificial intelligence, or information processing, which includes databases and information organization and retrieval. (Students who are interested in logical design or computer architecture may find it more appropriate to apply for admission to a graduate program in electrical engineering.) The required design project could be, for example, the design of a compiler for a large subset of a general-purpose programming language.

ELECTRICAL ENGINEERING

N. C. MacDonald, director; V. Anantharam, J. M. Ballantyne, T. Berger, A. W. Bojanczyk, G. M. Brown, R. R. Capranica, H.-D. Chiang, R. C. Compton, H. G. Craighead, D. F. Delchamps, L. F. Eastman, D. T. Farley, T. L. Fine, L. K. Grover, T. Hagfors, C. Heegard, C. R. Johnson, Jr., M. C. Kelley, P. M. Kintner, R. Kline, J. P. Krusius, S.-Y. Lee, M. E. Leeser, R. L. Liboff, Y.-H. Lo, F. T.-C. Luk, P. R. McIsaac, J. A. Nation, N. F. Otani, T. W. Parks, C. R. Pollock, C. Pottle, A. P. Reeves, C. E. Seyler, Jr., J. R. Shealy, A. O. Steinhardt, R. N. Sudan, C. L. Tang, R. J. Thomas, J. S. Thorp, H. C. Torng, C. B. Wharton, G. J. Wolga

Bachelor of Science Curriculum

The undergraduate Field Program in Electrical Engineering provides a foundation that reflects the broad scope of this engineering discipline.

Concentrations include computer engineering; control systems; electronic circuit design; information, communication, and decision theory; microwave electronics; plasma physics; power and energy systems; quantum and optical electronics; radio and atmospheric physics; and semiconductor devices and applications.

Students planning to enter the Field Program in Electrical Engineering must take ELE E 210, Introduction to Electrical Systems, as an engineering distribution course. In addition, the field program requires twelve courses, as shown below. Many of these courses are taught only once a year, either spring or fall, as indicated in the course descriptions.

Course	*Credits*
ELE E 230, Introduction to Digital Systems	4
ELE E 301, Electrical Signals and Systems I	4
ELE E 303, Electromagnetic Waves and Fields I	4
ELE E 315, Electrical Laboratory	5
A choice of three courses from among: ELE E 302, Electrical Signals and Systems II ELE E 304, Electromagnetic Waves and Fields II ELE E 306, Fundamentals of Quantum and Solid State Electronics ELE E 308, Fundamentals of Computer Engineering ELE E 310, Probability and Random Signals	12
ELE E electives with laboratory (3 courses)	11
ELE E electives (2 courses)	6
Total field credits	46*

*Credits in excess of 46 may be used to fill approved-, technical-, or free-elective requirements of the Common Curriculum.

ELE E electives may be selected from all courses taught in electrical engineering. At least one of the required ELE E electives with laboratory must be selected from a list including ELE E 316, 318, 320, 425, 430, 453, 457, 475, and 530. The other two may be selected from the above list or from among ELE E 423, 426, 433, 451, 452, 471, 481, 524, 526, 534, 536, 539, 554, 558, 572, and 576. (If ELE E 539 is taken for 6 credits, it counts as two courses. One course will count as an ELE E elective with laboratory, and the other credits may be used as ELE E electives or to meet any other degree requirement that can be satisfied by a 500-level technical course credit.)

Specialization is achieved through the five electrical engineering elective courses, as well as other courses in electrical engineering or related subjects taken as technical, approved, or free electives. The School of Electrical Engineering offers more than thirty courses that are commonly taken as electives by undergraduates. Students with advanced standing frequently take one or more graduate-level courses prior to graduation.

Students majoring in electrical engineering are expected to meet the following academic standards:

1) Students must achieve a grade-point average of at least 2.3 every semester.
2) No course with a grade of less than C– may be used to satisfy degree requirements in the field program or technical elective categories, or serve as a prerequisite for an electrical engineering course. (It may count as a free elective, however, unless it must be repeated.)
3) Students must complete ELE E 301, 303, and 315 by the end of the first semester of the junior year, and accumulate at least 10 credits each semester toward the remaining degree requirements in the field program and technical elective categories.

Master of Engineering (Electrical) Degree Program

The M.Eng.(Electrical) degree program prepares students either for professional work in electrical engineering and closely related areas or for further graduate study in a doctoral program. The M.Eng. degree differs from the Master of Science degree mainly in its emphasis on engineering design and analysis skills rather than basic research.

The program requires 30 credits of advanced technical course work, including a minimum of two two-term course sequences in electrical engineering. (A list of approved course sequences is available from the Master of Electrical Engineering Program Office.) An electrical engineering design project is also required and may account for 3 to 8 credits of the M.Eng. program. Occasionally, students take part in very extensive projects and may apply for a waiver of the 8-credit maximum. Students with special career goals, such as engineering management, may apply to use up to 8 credits of courses that have significant technical content, but are taught in disciplines other than engineering, mathematics, or the physical sciences.

Although admission to the M.Eng.(Electrical) program is highly competitive, all well-qualified students are urged to apply. Further information is available from the Master of Electrical Engineering Program Office in 222 Phillips Hall.

GEOLOGICAL SCIENCES

D. E. Karig, chair; R. W. Allmendinger, M. Barazangi, W. A. Bassett, J. M. Bird, A. L. Bloom, L. D. Brown, L. M. Cathles, J. L. Cisne, B. L. Isacks, T. E. Jordan, R. W. Kay, J. E. Oliver, F. H. T. Rhodes, W. B. Travers, D. L. Turcotte, W. M. White

Bachelor of Science Curriculum

Study in geological sciences is offered for students who are preparing for careers in solid earth science, for those who want a broad background in the geological sciences as preparation for careers in other fields, and for those who want to combine geological training with other sciences such as agronomy, astronomy and space science, biological sciences, chemistry, economics, mathematics, physics, or various fields of engineering. The Department of Geological Sciences is organized as an intercollege department in the College of Arts and Sciences and the College of Engineering. College of Arts and Sciences students should consult that college's section on geological sciences as well as the course listing here.

Students in the College of Engineering who plan to enter the Field Program in Geological Sciences may take one or more of the several 100-level introductory courses as electives, or take GEOL 201 (Engr 201), preferably during their freshman or sophomore year. Those interested in geobiology should also take Biological Sciences 101–103 and 102–104.

Geological Sciences requires the following courses for the major: GEOL 210, 214, 326, 355, 356, 375, 388, and one other 300-, 400-, or 600-level course. A summer field geology course is also required.

Core courses may be taken in any reasonable sequence, except that GEOL 355, which is offered in the fall, should be taken before GEOL 356, which is offered in the spring. GEOL 326 and 375 should be taken relatively early in the major program as preparation for the summer field camp, which usually follows the junior year. Students with adequate preparation may attend field camp at an earlier time.

It is recommended that students intending to specialize in *geophysics* select most of their approved and technical electives from the following courses or their equivalents:

A&EP 333, Mechanics of Particles and Solid Bodies

A&EP 355, Intermediate Electromagnetism

A&EP 356, Intermediate Electrodynamics

A&EP 434, Continuum Physics

Phys 410, Advanced Experimental Physics

T&AM 310–311, Advanced Engineering Analysis I and II

It is recommended that students intending to specialize in *geochemistry* (including petrology and mineralogy) select most of their approved and technical electives from the following courses or their equivalents:

Chem 207, 208, General Chemistry

Chem 287–288, Introductory Physical Chemistry

Chem 300, Quantitative Chemistry

Chem 301, Experimental Chemistry I

Chem 302, Experimental Chemistry II

Chem 303, Experimental Chemistry III

Chem 357–358, Introductory Organic Chemistry

Chem 389–390, Physical Chemistry I and II

MS&E 331, Structural Characterization and Properties of Materials

MS&E 335, Thermodynamics of Condensed Systems

It is recommended that students intending to specialize in *geobiology* select most of their approved and technical electives from the following courses or their equivalents:

Bio S 241, Introductory Botany

Bio S 274, The Vertebrates

Bio S 371, Human Paleontology

Bio S 373, The Invertebrates

Bio S 261, General Ecology

Bio S 448, Plant Evolution and the Fossil Record

Bio S 378, Organic Evolution

Chem 253, Elementary Organic Chemistry

It is recommended that students who want to pursue further training or immediate employment in *applied geology* (environmental and engineering geology, geohydrology, petroleum geology, or geological engineering) select most of their approved and technical electives from the following courses or their equivalents, with two of the four from the same field:

ABEN 371, Introduction to Hydrology and Ground-Water Pollution

ABEN 475, Environmental Systems Analysis

ABEN 671, Analysis of the Flow of Water and Chemicals in Soils

SCAS 361, Genesis, Classification, and Geography of Soils

SCAS 667, Soil Physics

SCAS 366, Soil Chemistry

CEE 341, Introductory Soil Mechanics

CEE 611, Remote Sensing Applications

CEE 612, Physical Environment Evaluation

CEE 615, Digital Image Processing

CEE 640, Foundation Engineering

MS&E 331, Structural Characterization and Properties of Materials

MS&E 445, Mechanical Properties of Materials

CEE 331, Fluid Mechanics

CEE 332, Hydraulic Engineering

CEE 351, Environmental Quality Engineering

CEE 633, Flow in Porous Media and Groundwater

OR&IE 260, Introductory Engineering Probability

OR&IE 370, Introduction to Statistical Theory with Engineering Applications

Students intending to specialize in *economic geology* or pursue careers in the mining industries or mineral exploration should consider including economics courses among their humanities and social sciences electives and should select most of their approved and technical electives from the groups of courses listed above for geochemistry and applied geology plus the following additional courses:

CEE 654, Aquatic Chemistry

CEE 741, Rock Engineering

Students who want a more general background or who want to remain uncommitted with regard to specialty must choose at least two of their three approved electives from the same field, at a level comparable to the courses listed above. The technical electives may be chosen from offerings in geological sciences or in other science or engineering fields and should be at the 300 level or above. Outstanding students may request substitution of GEOL 491 and 492, Undergraduate Research, for a fourth-year technical elective.

Students intending to pursue graduate study in geology are reminded that some graduate schools require proficiency in reading the scientific literature in one or two of the three languages, French, German, and Russian.

Undergraduate preparation in at least one of these languages is therefore advantageous.

Master of Engineering (Geological Sciences Degree Program)

The Master of Engineering (Geological Sciences) degree is intended to provide future professional geologists with the geological and engineering background they will need to analyze and solve engineering problems that involve geological variables and concepts. Students may choose a program from one of several options, or tailor a program to meet their special interests with the help of a faculty adviser.

The program requires 30 credits of postgraduate instruction, at least 10 of which must involve engineering design. Students must also complete a design project, worth between 3 and 12 credits, that has a significant geological component and results in substantial conclusions or recommendations.

General information on admission and degree requirements for the M.Eng. degree programs can be found in the college's introductory section.

MATERIALS SCIENCE AND ENGINEERING

J. M. Blakely, director; D. G. Ast, R. Dieckmann, E. Giannelis, D. T. Grubb, E. J. Kramer, C. Y. Li, C. S. Nichols, C. Ober, R. Raj, A. L. Ruoff, S. L. Sass, M. O. Thompson

Bachelor of Science Curriculum

Students who major in materials science and engineering are required to take MS&E 261, Introduction to Mechanical Properties of Materials, before the end of their junior year. They are strongly urged to take it as an engineering distribution course during their sophomore year. Students may enter the field after taking MS&E 262, Introduction to Electrical Properties of Materials, but they must still take MS&E 261 in order to graduate. Students who choose to major in materials science and engineering can concentrate in any one of the following areas of specialization: materials science, solid state, metallic materials, ceramic materials, polymeric materials, or electronic materials. Specialization is achieved through the selection of technical electives in the junior and senior years. The materials science and engineering field program leading to the Bachelor of Science degree consists of

Courses	*Credits*
MS&E 331, Structural Characterization of Materials	4
MS&E 332, Electrical and Magnetic Properties of Materials	3
Field-approved electives*	6
MS&E 335 Thermodynamics of Condensed Systems	4
MS&E 336, Kinetics, Diffusion, and Phase Transformations	3
MS&E 441, Microprocessing of Materials	3
MS&E 442, Macroprocessing of Materials	3
MS&E 443/435, Senior Materials Laboratory I or Senior Thesis I	3/4
MS&E 444/435, Senior Materials Laboratory II or Senior Thesis II	3/4
MS&E 445, Mechanical Properties of Materials	3
MS&E 447, Materials Design Concepts I & II	4
	37/39

*These courses serve as two of the four required specialization courses. The other specialization courses are technical electives. Optional research involvement courses provide undergraduates with the opportunity to work with faculty members and their research groups on current projects.

To continue in good standing in the Field of Materials Science and Engineering, students must

1) Maintain an overall 2.0 term average
2) Maintain an average of 2.3, with no grade below C, in the department's basic curriculum.
3) Complete MS&E 261 or 262 prior to the end of the junior year.

The department's basic curriculum consists of all the required MS&E courses including MS&E 261 and the four courses comprising the student's area of specialization.

An attractive and very challenging program combines the materials science and engineering curriculum with that of either electrical engineering or mechanical engineering, leading to a double major. The combination of materials science and engineering with electrical engineering is particularly well suited to students who will eventually be employed in the electronic materials industry. Mechanical engineers knowledgeable in materials science also will be well equipped for technical careers. Curricula leading to the double-major degree must be approved by both of the departments involved. Students are urged to plan such curricula as early as possible.

Master of Engineering (Materials) Degree Program

Students who have completed a four-year undergraduate program in engineering or the physical sciences can be considered for admission into the M.Eng.(Materials) program. This program consists of 30 credits, including course work and a master's design project. The project, which requires individual effort and initiative, is carried out under the supervision of a faculty member. Twelve credits are devoted to the project, which is normally experimental in nature, although analytical projects are also possible.

Courses for the additional 18 credits are selected from the graduate-level classes in materials science and engineering and from other related engineering fields approved by the faculty. Typically half of the courses are from MS&E. One 3-credit technical elective must include advanced mathematics (modeling, computer application, or computer modeling), beyond the MS&E undergraduate requirements.

MECHANICAL AND AEROSPACE ENGINEERING

F. C. Moon, director; P. L. Auer, C. T. Avedisian, D. L. Bartel, J. F. Booker, A. H. Burstein, D. A. Caughey, B. J. Conta, P. R. Dawson, P. C. T. deBoer, E. M. Fisher, A. R. George, F. C. Gouldin, J. C. Koechling, S. E. Landsberger, S. Leibovich, M. Y. Louge, J. L. Lumley, F. K. Moore, R. M. Phelan, S. B. Pope, M. L. Psiaki, E. L. Resler, Jr., S. F. Shen, D. G. Shepherd, D. L. Taylor, K. E. Torrance, H. B. Voelcker, K. K. Wang, Z. Warhaft, C. H. K. Williamson, N. Zabaras

Members of the faculty of the graduate Fields of Aerospace Engineering and Mechanical Engineering are listed in the *Announcement of the Graduate School.*

Bachelor of Science Curriculum in Mechanical Engineering

The upperclass Field Program in Mechanical Engineering is designed to provide a broad background in the fundamentals of this discipline as well as to offer an introduction to the many professional and technical areas with which mechanical engineers are concerned. Two main areas of concentration, corresponding to the two major streams of mechanical engineering technology, are offered in the field program.

Mechanical systems, design, and manufacturing is concerned with the design, analysis, testing, and manufacture of machinery, vehicles, devices, and systems. Particular areas of concentration include mechanical design and analysis, computer-aided design, vehicle engineering, composite materials, vibrations and control systems, biomechanics, and manufacturing engineering.

Engineering of fluids, energy, and heat-transfer systems has as its main concerns the experimental and theoretical aspects of fluid flow and heat transfer; the development of fossil, solar, and other energy sources for uses such as electric-power generation; industrial heating; terrestrial and aerospace transportation; and the use of heating, air conditioning, refrigeration, and noise- and pollution-control techniques to modify the human environment.

The undergraduate field program is a coordinated sequence of courses beginning in the sophomore year. During that year students who plan to enter the field of mechanical engineering take Engr 202 (also T&AM 202) as an engineering distribution course. They also take Engr 203 (also T&AM 203) which is a field requirement that may simultaneously satisfy Common Curriculum requirements as an approved (or free) elective. Both of these courses are prerequisites for courses to be taken during the junior year. During either the sophomore or junior year students take Engr 221 (also M&AE 221) and Engr 261 (also MS&E 261).

The requirements for the degree of Bachelor of Science in mechanical engineering are as follows:

1) Completion of the Common Curriculum. During the upperclass years this will typically mean earning credit for two technical electives, one approved elective, two free electives, and three humanities or social sciences courses.
2) Completion of the field requirements, which consist of ten required courses

(beyond Engr 202 and 203, already mentioned), and three elective courses (9 credits). The ten additional required courses are

Engr 210, Introduction to Electrical Systems

Engr 221, Introduction to Thermodynamics

Engr 261, Introduction to Mechanical Properties of Materials

M&AE 312, Fundamentals of Manufacturing Processes

M&AE 323, Introduction to Fluid Mechanics

M&AE 324, Heat Transfer

M&AE 325, Mechanical Design and Analysis

M&AE 326, System Dynamics

M&AE 427, Mechanical Engineering Laboratory

M&AE 428, Engineering Design

If Engr 210 or 221 or 261 is taken as an engineering distribution course, the corresponding field requirement is replaced by an alternate technical elective. The three elective courses consist of one mathematics elective (3 credits), a field elective (3 credits), and a field design elective (3 credits). These electives are chosen from lists approved by the faculty of the Sibley School of Mechanical and Aerospace Engineering.

An additional graduation requirement of the field program is proof of elementary competence in technical drawing. This proof may be given in a number of ways, including satisfactory completion of

a) a technical drawing course in high school or in a community college

b) Engineering 102, Drawing and Engineering Design

c) another technical drawing course at Cornell, or

d) a departmental examination.

The proof is expected before completion of M&AE 325, Mechanical Design and Analysis.

The computer applications requirement of the Common Curriculum may be satisfied by several courses, including M&AE 389, 417, 489, 575, and 670.

The writing requirement of the Common Curriculum is satisfied by M&AE 427.

Introduction to Electrical Systems (ELE E 210) may be replaced or supplemented by Introductory Electronics (Physics 360).

A limited set of third-year courses is offered each summer under the auspices of the Engineering Cooperative Program.

More-detailed materials describing the field program and possible concentrations may be obtained from the Sibley School of Mechanical and Aerospace Engineering, Upson Hall.

Preparation in Aerospace Engineering

Although there is no separate undergraduate program in aerospace engineering, students may prepare for a career in this area by majoring in mechanical engineering and taking a number of aerospace engineering electives such as M&AE 405, 506, 507, 530, 531, and 536. Students may prepare for the graduate program in aerospace engineering by majoring in mechanical engineering, in other appropriate engineering specialties such as electrical engineering or engineering physics, or in the physical sciences. Other subjects recommended as preparation for graduate study include thermodynamics, fluid mechanics, applied mathematics, chemistry, and physics.

Master of Engineering (Aerospace) Degree Program

The M.Eng.(Aerospace) degree program provides a one-year course of study for those who wish to develop a high level of competence in current technology and engineering design. This degree requires 30 credits of course work and is subject to the rules adopted by the Graduate Professional Program Committee. Because aerospace engineering is continually engaged in new areas, an essential guideline for the program is to reach beyond present-day practices and techniques. This is achieved by supplying the student with the fundamental background and the analytical techniques that will remain useful in all modern engineering developments. Aerospace students register for 1 credit a term on an S-U basis in M&AE Colloquium (M&AE 799). All other courses must have letter grades. To fulfill the design project requirement, students register for M&AE 592, Seminar and Design Project in Aerospace Engineering, for 2 credits per term. Other requirements are four aerospace core courses (minimum of 12 credits), two math courses (6 credits), and two technical electives (6 credits).

Aerospace Core Courses

3 credits:

M&AE 506, Aerospace Propulsion Systems

M&AE 507, Dynamics of Flight Vehicles

M&AE 530, Fluid Dynamics

M&AE 531, Boundary Layers

M&AE 536, Turbomachinery and Applications

M&AE 543, Combustion Processes

M&AE 559, Introduction to Controlled Fusion

M&AE 569, Mechanical and Aerospace Structures I

4 credits:

M&AE 601, Foundations of Fluid Dynamics and Aerodynamics

M&AE 602, Incompressible Aerodynamics

M&AE 603, Compressible Aerodynamics

M&AE 608, Physics of Fluids

M&AE 639, Aerodynamic Noise Theory

M&AE 651, Advanced Heat Transfer

M&AE 652, Thermodynamics and Phase Change Heat Transfer

M&AE 653, Experimental Methods in Fluid Mechanics, Heat Transfer, and Combustion

M&AE 670, Mechanical and Aerospace Structures II

M&AE 704, Theory of Viscous Flows

M&AE 732, Analysis of Turbulent Flows

M&AE 733, Stability of Fluid Flow

M&AE 734, Turbulence and Turbulent Flow

M&AE 736, Computational Aerodynamics

M&AE 737, Computational Heat Transfer and Fluid Mechanics

Nominations of Special Committee chair (adviser) must be filed with the Graduate School within three weeks of the start of classes. A formal selection of course work for the term must be filed within three weeks of the start of classes. A program of courses must be submitted for committee approval by the end of the first week of classes.

The school has particular strengths in the areas of fluid dynamics, aerodynamics, high-temperature gasdynamics, turbulence, chemical kinetics, aerodynamic noise, sonic boom, nonlinear waves, atmospheric flows, combustion processes in low-pollution engines, and solution of flow problems by numerical methods. Professional design projects may be arranged in any of these areas.

Master of Engineering (Mechanical) Degree Program

The M.Eng.(Mechanical) degree program provides a one-year course of study for those who wish to develop a high level of competence in current technology and engineering design.

The program is designed to be flexible so that candidates may concentrate on any of a variety of specialty areas. These areas include biomechanical engineering, combustion, energy and power systems, fluid mechanics, heat transfer, materials and manufacturing engineering, mechanical systems and design, and CAD/CAM (computer-aided design/computer-aided manufacturing). An individual student's curriculum includes a 4-credit design course, a major consisting of a minimum of 12 credits, and sufficient technical electives to meet the degree requirement of 30 credits. It is highly recommended that students register for 1 credit per term on an S–U basis in M&AE Colloquium (M&AE 799). The design course (M&AE 590) is a formal consideration of the complete design process, including planning, cost analysis, and analytical methods. Students conduct one or more specific projects during the course. These projects may arise from individual faculty interests or from collaboration with industry. A student may replace the design course with an independent design project. Such a project must have a mechanical engineering design focus and have the close supervision of a faculty member.

A coordinated program of courses for the entire year is agreed upon by the student and the faculty adviser. This proposed program, together with a statement of overall objectives and a statement of purpose for the major, is submitted for approval to the Master of Engineering Committee by the end of the first week of class. Any subsequent changes must also be approved by this committee.

The courses that constitute the major must be graduate-level courses in mechanical and aerospace engineering or a closely related field such as theoretical and applied mechanics. At least 24 credits of the total for the degree must be in mechanical engineering or related areas, and in general all courses must be beyond the level of those required in the undergraduate program in mechanical engineering. Credit may be granted for an undergraduate, upper-level first course in some subject area if the student has done little or no previous work in that area, but such courses must have the special approval of the Master of Engineering Committee.

The technical electives may be courses of appropriate level in mathematics, physics, chemistry, or engineering; a maximum of 6 credits may be taken in areas other than these if the courses are part of a well-defined program leading to specific professional objectives. It is expected that all students will use technical electives to develop proficiency in mathematics beyond the minimum required of Cornell engineering undergraduates if they have not already done so before entering the program. Courses in advanced engineering mathematics or statistics are particularly recommended.

Students enrolled in the M.Eng.(Mechanical) program may take courses that also satisfy the requirements of the Cornell Manufacturing Engineering and Productivity Program (COMEPP), leading to a special dean's certificate in manufacturing engineering. The Energy Engineering option can also lead to a special dean's certificate.

NUCLEAR SCIENCE AND ENGINEERING

Faculty members in the graduate Field of Nuclear Science and Engineering who are most directly concerned with the Master of Engineering (Nuclear) curriculum include D. D. Clark (faculty representative), K. B. Cady, H. H. Fleischmann, D. A. Hammer, V. O. Kostroun, and S. C. McGuire.

Undergraduate Study

Although there is no special undergraduate field program in nuclear science and engineering, students who intend to enter graduate programs in this area are encouraged to begin specialization at the undergraduate level. This may be done by choice of electives within regular field programs (such as those in engineering physics, materials science and engineering, and civil, chemical, electrical, or mechanical engineering) or within the College Program.

Master of Engineering (Nuclear) Degree Program

The two-term curriculum leading to the M.Eng.(Nuclear) degree is intended primarily for individuals who want a terminal professional degree, but it may also serve as preparation for doctoral study in nuclear science and engineering. The course of study covers the basic principles of nuclear reactor systems with a major emphasis on reactor safety and radiation protection and control. The special facilities of the Ward Laboratory of Nuclear Engineering are described in the *Announcement of the Graduate School.*

The interdisciplinary nature of nuclear engineering allows students to enter from a variety of undergraduate specializations. The recommended background is (1) an accredited baccalaureate degree in engineering, physics, or applied science; (2) physics, including atomic and nuclear physics; (3) mathematics, including advanced calculus; and (4) thermodynamics. Students should see that they fulfill these requirements before beginning the program. In some cases, deficiencies in preparatory work may be made up by informal study during the preceding summer. General admission and degree requirements are described in the college's introductory section.

The following courses are included in the 30-credit program:

Fall term

A&EP 609, Low-Energy Nuclear Physics

A&EP 612, Nuclear Reactor Theory

A&EP 633, Nuclear Engineering

Technical elective

Spring term

A&EP 651, Nuclear Measurements Laboratory

Technical elective

Engineering design project

Mathematics or physics elective

Engineering electives should be in a subject area relevant to nuclear engineering, such as energy conversion, radiation protection and control, feedback control systems, magnetohydrodynamics, controlled thermonuclear fusion, and environmental engineering. The list below gives typical electives.

M&AE 651, Advanced Heat Transfer

ELE E 581, Introduction to Plasma Physics

ELE E 582, Advanced Plasma Physics

ELE E 589, Magnetohydrodynamics

ELE E 471, Feedback Control Systems

ELE E 472, Digital Control Systems

A&EP 636, Seminar on Thermonuclear Fusion Reactors

A&EP 638, Intense Pulsed Electron and Ion Beams: Physics and Technology

NS&E 484, Introduction to Controlled Fusion: Principles and Technology

NS&E 637, Advanced Topics in Plasma Diagnostic Techniques

MS&E 459, Physics of Modern Materials Analysis

Energy Engineering Option

Nuclear Science and Engineering is one of the M.Eng. fields participating in the newly organized Energy Engineering Option. Two energy-conversion courses, an environmental-consequences course, and a new Energy Seminar are required. The courses are to be chosen from approved lists which include, in addition to previously offered courses, a new one, NS&E 504, Nuclear Energy Systems, specifically designed for Energy Option students.

OPERATIONS RESEARCH AND INDUSTRIAL ENGINEERING

J. A. Muckstadt, director; D. C. Heath, L. I. Weiss, associate directors; R. E. Bechhofer, L. J. Billera, R. G. Bland, P. L. Jackson, W. L. Maxwell, N. U. Prabhu, J. Renegar, S. Resnick, R. Roundy, D. Ruppert, G. Samorodnitsky, L. W. Schruben, D. B. Shmoys, É. Tardos, M. J. Todd, L. E. Trotter, Jr., B. W. Turnbull

Bachelor of Science Curriculum in Operations Research and Engineering

The program is designed to provide a broad and basic education in the techniques and modeling concepts needed to analyze and design complex systems and to provide an introduction to the technical and professional areas with which operations researchers and industrial engineers are concerned. An accelerated honors program is available for exceptional students interested in pursuing graduate studies.

A student who plans to enter the Field Program in Operations Research and Engineering should take Introductory Engineering Probability (Engr 260). For a student who has not taken Engr 260, entry into the field program in OR&E is possible only by permission of the associate director for undergraduate studies. In addition, it is recommended that Computers and Programming (COM S 211 or Engr 211) be taken before entry into the OR&E field program. Early consultation with a faculty member of the school or with the associate director for undergraduate studies can be helpful in making appropriate choices. The required courses for the OR&E field program and the typical terms in which they are taken are as follows:

Term 5	*Credits*
OR&IE 320, Optimization I	4
OR&IE 350, Cost Accounting, Analysis, and Control	4
OR&IE 370, Introduction to Statistical Theory with Engineering Applications	4
COM S 211, Computers and Programming*	3
Course in humanities and social sciences	3

*If COM S 211 has been used as an engineering distribution course, an appropriate 3- or 4-credit technical elective must be substituted.

Term 6	
OR&IE 321, Optimization II	4
OR&IE 361, Introductory Engineering Stochastic Processes	4
OR&IE 410, Industrial Systems Analysis	4
Behavioral science†	3
Course in humanities and social sciences	3

†The behavioral science requirement can be satisfied by any one of several courses of an advanced nature, including Graduate School of Management (GSM) NCC 504 (offered only in the fall), which is recommended for those contemplating the pursuit of a graduate business degree, and Industrial and Labor Relations 120, 121, 151, and 320. The adviser must approve the selection in all cases.

The basic senior-year program, from which individualized programs are developed, consists of the following courses:

Minimum credits	
OR&IE 580, Digital Systems Simulation	4
Three upperclass OR&IE electives as described below	9
Two technical electives	6
Two courses in humanities and social sciences	6
Two free electives	6

Available OR&E electives are as follows:

Industrial systems: OR&IE 415, 416, 417, 421, 451, 516, 525, and 562 and GSM NBA 601 and 641*

Optimization methods: OR&IE 431, 432, and 435

Applied probability and statistics: OR&IE 462, 472, 475, 476, 561, 563, 575, and 577

*No more than one course in the Graduate School of Management may be taken as an OR&IE elective.

Scholastic requirements for the field are a passing grade in every course, an overall average of at least 2.0 for each term the student is enrolled in the school, an average of 2.0 or better for OR&IE field courses, and satisfactory progress toward the completion of the degree requirements. The student's performance is reviewed at the conclusion of each term.

Master of Engineering (OR&IE) Degree Program

This one-year professional degree program stresses applications of operations research and industrial engineering and requires completion of a project. The course work centers on additional study of analytical techniques, with particular emphasis on engineering applications, especially in the design of new or improved man-machine systems, information systems, and control systems.

General admission and degree requirements are described in the introductory "Degree Programs" section. The M.Eng.(OR&IE) program is integrated with the undergraduate Field Program in Operations Research and Engineering. Also welcome are requests for admission from Cornell undergraduates in engineering programs other than OR&IE or from qualified non-Cornellians. To ensure completion of the program in one calendar year, the entering student should have completed courses in probability theory and basic probabilistic models and in computer programming and should have acquired some fundamental knowledge of economic concepts required for decision making. Students interested in the manufacturing engineering option should obtain further information regarding program requirements from the office of the Cornell Manufacturing Engineering and Productivity Program, 103 Engineering and Theory Center Building. Information concerning industrial internships can be obtained from the Master of Engineering Program Office, 148 Olin Hall.

I. For matriculants with preparation comparable to that provided by the undergraduate Field Program in Operations Research and Engineering:

Fall term	*Credits*
OR&IE 516, Case Studies	1
OR&IE 893, Applied OR&IE Colloquium	1
OR&IE 599, Project	1
Three technical electives	9
Spring term	
OR&IE 894, Applied OR&IE Colloquium	1
OR&IE 599, Project	minimum of 4
Three technical electives	9

The electives specified above will normally be chosen from graduate courses offered by the School of Operations Research and Industrial Engineering. A minimum of 30 credits must be taken to complete the program.

II. For matriculants from other fields who minimally fulfill the prerequisite requirements (students who have the equivalent of OR&IE 520, 523, and 570 will take technical electives in their place):

Fall term	*Credits*
OR&IE 570, Introduction to Statistical Theory with Engineering Applications	4
OR&IE 520, Operations Research I	4
OR&IE 516, Case Studies	1
OR&IE 580, Digital Systems Simulation	4
OR&IE 893, Applied OR&IE Colloquium	1
OR&IE 599, Project	1
Spring term	
OR&IE 523, Introduction to Stochastic Modeling	4
OR&IE 894, Applied OR&IE Colloquium	1
OR&IE 599, Project	minimum of 4
Two technical electives	6

Students fulfill the project requirement by working as part of a group of no more than four students on an operational systems problem that actually exists in some organization. Appropriate problems are suggested by manufacturing firms, retailing organizations, service organizations, government agencies, and educational institutions.

Cooperative Program with the Johnson Graduate School of Management

Undergraduates majoring in operations research and engineering may be interested in a cooperative program at Cornell that leads to both Master of Engineering and Master of Business Administration (M.B.A.) degrees. With appropriate curriculum planning such a combined B.S./M.Eng./M.B.A. program can be completed in six years.

An advantage for OR&IE majors is that they study, as part of their undergraduate curriculum, several subjects that are required for the M.B.A. degree. (This is because modern management is concerned with the operation of production and service systems, and much of the analytical methodology required to deal with operating decisions is the same as that used by systems engineers in designing these systems.) An early start on meeting the business-degree requirements permits students accepted into the cooperative program to earn both the M.Eng.(OR&IE) and M.B.A. degrees in two years rather than the three years such a program would normally take.

The details of planning courses for this program should be discussed with the admissions office of the Johnson Graduate School of Management.

In accordance with this program the candidate would qualify for the B.S. degree at the end of four years, the M.Eng.(OR&IE) degree at the end of five years, and the M.B.A. degree at the end of six years.

Further details and application forms may be obtained at the office of the School of Operations Research and Industrial Engineering, Engineering and Theory Center Building, and at the admissions office of the Johnson Graduate School of Management.

STATISTICS CENTER

The Cornell Statistics Center coordinates a university-wide program in statistics and probability. Students interested in graduate study in probability and statistics should apply to the Field of Statistics or to one of the other graduate fields that offer related coursework.

A list of courses in probability and statistics recommended for graduate students in the Field of Statistics can be found in the description of the Cornell Center for Statistics in the section "Interdisciplinary Centers and Programs." Further information can be obtained from the director of the Statistics Center, Lawrence Brown, or the field representative for statistics, George Casella, both at 482 Caldwell Hall.

THEORETICAL AND APPLIED MECHANICS

J. A. Burns, chair; H. D. Conway, J. M. Guckenheimer, E. W. Hart, T. J. Healey, P. J. Holmes, C. Y. Hui, J. T. Jenkins, R. H. Lance, S. Mukherjee, Y. H. Pao, S. L. Phoenix, R. H. Rand, P. Rosakis, A. L. Ruina, W. H. Sachse, A. Zehnder

Undergraduate Study

The Department of Theoretical and Applied Mechanics is responsible for courses in engineering mechanics and engineering mathematics, some of which are part of the Common Curriculum.

College Program in Engineering Science

A student may enroll in the College Program in Engineering Science, which is sponsored by the Department of Theoretical and Applied Mechanics. The College Program is described in the section on undergraduate study in the College of Engineering.

Master of Engineering (Engineering Mechanics) Degree Program

Composite materials designed to meet specific requirements of weight, strength, and rigidity are used increasingly in the manufacture of everyday structures and components. The Master of Engineering (Engineering Mechanics) degree program focuses on the mechanical behavior of advanced composite materials and structures and prepares students to play a role in the development of this new technology. Students from diverse engineering backgrounds, such as mechanics, structures, and materials, as well as aerospace and biomedical engineering, can normally complete the requirements for the professional Master of Engineering degree in one year.

Students usually select courses totaling 20 credits, which may be chosen from four different departments. These courses explore the nature of modern composite materials, provide a background in the fundamentals of these materials and their mechanics, and introduce techniques that will be useful in

subsequent work. The program offers a series of topical, four-week mini courses on specialized subjects related to composites, taught by experts in the field. The degree program requires satisfactory completion of 30 credits of course work, including 12 credits of courses that involve analysis, computation, design, or laboratory experience. Of these 12 credits, at least 6 must be earned in T&AM 501, 502 *(Topics in Composites I, II)*, 555 *(Introduction to Composite Materials)*, or 655 *(Advanced Composite Materials and Structures)*. Up to 10 credits will be awarded for an individual project involving composites. The balance of the required credits may be earned in elective courses chosen from those in the course listing below or others approved by the student's adviser.

The Department of Theoretical and Applied Mechanics has several laboratories equipped for the fabrication and mechanical testing of composite materials and structures. Extensive computing resources are available for numerical computations, design, or other numerical- or simulation-research activities related to composites. The Materials Science Center, the Center for Theory and Simulation in Science and Engineering, and the Computer-Aided Design Instructional Facility provide additional state-of-the-art laboratories and computer resources. Core courses in the M.Eng.(Engineering Mechanics) program are:

Course	*Credits*
T&AM 555, Introduction to Composite Materials	3
T&AM 655, Advanced Composite Materials and Structures	4
T&AM 663, Solid Mechanics I	4
T&AM 501, Topics in Composites I	1–3
Selected from the following:	
Analysis of Composite Structures	
Mechanical Testing of Composite Constituents	
Fracture Testing of Composites	
Reliability Models for Composites	
Design Principles for Composite Structures	
Biological Composites	
T&AM 502, Topics in Composites II	1–3
Selected from the following:	
Effective Properties of Composites	
Interface Failure and Fracture Processes in Composites	
Boundary-Element Methods for Composites	
Nondestructive Testing of Composites	
Software for Composite Design	
Novel Composite Structures	
T&AM 591, Master of Engineering Design Project I	3–5
T&AM 592, Master of Engineering Design Project II	5–10
Complementary courses from other departments include:	
MS&E 450, Physical Metallurgy	3
MS&E 452, Properties of Solid Polymers	3
MS&E 605, Plastic Flow and Fracture of Materials	3
M&AE 465, Biomechanical Systems — Analysis and Design	3
M&AE 569, Mechanical and Aerospace Structures	3
M&AE 670, Mechanical and Aerospace Structures II— Finite-Element Methods	4
CEE 770, Engineering Fracture Methods	3
CEE 772, Finite-Element Analysis	3

ENGINEERING COURSES

Courses offered in the College of Engineering are listed under the various departments and schools.

Courses are identified with a standard abbreviation followed by a three-digit number.

Engineering Common Courses	Engr
Agricultural Engineering	ABEN
Applied and Engineering Physics	A&EP
Chemical Engineering	CHEME
Civil and Environmental Engineering	CEE
Computer Science	COM S
Electrical Engineering	ELE E
Geological Sciences	GEOL
Materials Science and Engineering	MS&E
Mechanical and Aerospace Engineering	M&AE
Nuclear Science and Engineering	NS&E
Operations Research and Industrial Engineering	OR&IE
Theoretical and Applied Mechanics	T&AM

ENGINEERING COMMON COURSES

Courses of General Interest

Courses in this category are of general interest and cover technical, historical, and social issues relevant to the engineering profession. These courses may also include seminar or tutorial type courses.

ENGRG 101 The Computer Age (also COM S 101)
Fall, summer. 3 credits. Credit is granted for both COM S 100 and 101 only if 101 is taken first.
2 lecs, 1 rec, 1 evening exam.
An introduction to computer science and programming for students in nontechnical areas. The aims of the course are to acquaint the student with the major ideas in computer science and to develop an appreciation of algorithmic thinking. Topics may include the history of computation; microtechnology; the retrieval and transmission of information; scientific computing; computer graphics, art, and music; robotics, natural-language processing, and machine intelligence. Students become acquainted with the notion of an algorithm by writing several programs in Pascal or Scheme and testing them on microcomputers. The amount of programming is about half that taught in Engr 100.

ENGRG 102 Drawing and Engineering Design (also M&AE 102)
Fall, spring. 1 credit. Half-term course offered twice each semester. Enrollment limited to thirty students each half term. Recommended for students without previous mechanical drawing experience. S-U grades optional.
2 lecs, 1 lab.
Introduction to drawing and graphic techniques useful in design, analysis, and presentation of ideas. Use of computer-aided drafting software is introduced in the final design project.

ENGRG 150 Engineering Tutorial Program
Fall, spring. 1 credit. First-year students only. S–U grades only.
Weekly discussion of academic and nonacademic topics of interest to selected engineering faculty advisers and their students. Topics may include engineering applications of mathematics and science, recent science and engineering developments, such as supercomputing and superconductors, or career opportunities in engineering and related fields. Some opportunity for visits to academic and research facilities on campus.

ENGRG 250 Technology in Western Society (also ELE E 250)
Fall. 3 credits. Meets humanities distribution requirement.
R. Kline.
The course investigates the interaction between technology and Western society from the earliest times to the present, focusing on Western Europe up to the British industrial revolution in the late eighteenth century, and on the United States thereafter. Topics include the economic and social aspects of industrialization; the myths of heroic inventors like Morse, Edison, and Ford; the government's promotion and regulation of technology through such measures as the patent system, the funding of research and development, and regulatory legislation; the origins of modern systems of mass production; and the spread of the automobile and microelectronics cultures in the United States.

ENGRG 292 The Electrical and Electronic Revolutions (also ELE E 292)
Spring. 3 credits. Approved for humanities distribution, not for ELE E or as a technical elective.
R. Kline.
Explores the history of electricity in society from the 1830s to the present by considering the technical and social history of telecommunications, the electric-power industry, microelectronics, radio, television, and computers. Emphasis is placed on the changing relationship between science and technology, the institutional context of research and development, the economic aspects of innovation, and the social implications of this technology.

ENGRG 321 Microeconomic Analysis (also CEE 321 and Economics 313, lecture 5)
Fall. 4 credits. Prerequisite: one semester of calculus. A social science elective for engineering students.
R. E. Schuler.
Intermediate microeconomic analysis similar to Economics 313 but emphasizing mathematical techniques and engineering-design implications. Theory of consumer choice and efficient production; analysis of monopoly and competitive markets; theories of distribution, market equilibrium, and welfare economics.

ENGRG 322 Economic Analysis of Government (also CEE 322 and Economics 308)
Spring. 4 credits. Prerequisites: one semester of calculus, plus CEE 321 or Economics 313. A social science elective for engineering students.
R. E. Schuler.
Analysis of government intervention in a market economy and implications for engineering planning and design. Market imperfections, public goods and public decision making, public finance, cost-benefit analysis of government projects, environmental regulation, risk management, and macroeconomic topics.

ENGRG 323 Engineering Economics and Management (also CEE 323)
Spring. 3 credits. Primarily for juniors and seniors.
D. P. Loucks.
Introduction to engineering and business economics and to methods of operations research. Intended to give students a working knowledge of money management and how to make economic comparisons of alternative engineering designs or projects. Project management, inflation, taxation, depreciation, financial planning, and basic operations-research techniques of simulation and optimization are introduced and applied to economic investment problems.

ENGRG 356 Women in Engineering Career Planning Seminar
Spring. 1 credit. Limited to 25 students. S–U grades only. Open to juniors and seniors in engineering and related fields.
1 sem. M. Fish.
Covers aspects of transition to the engineering profession and related issues especially of interest to women. Topics include career and life planning, the job-search process, interviewing strategies, juggling career and family, graduate education, sexual harassment and sexism in the workplace, and networking. Corporate professionals and Cornell faculty and staff participate in class discussions.

ENGRG 360 Ethical Issues in Engineering
Spring. 3 credits. A social-science elective for engineering students. Open to juniors and seniors.
3 lecs.
A discussion of ethical issues encountered in engineering practice, such as the rights of engineers in corporations, responsibility for harmful actions, whistleblowing, conflicts of interest, and decision making based on cost-benefit analysis. Codes of ethics of professional engineering societies and ethical theory will be used to help sort out conflicting obligations the engineer may feel toward public safety, professional standards, employers, colleagues, and family. Students will present a case study to the class, along the lines of the Space-Shuttle Challenger disaster, the Kansas City Hyatt-Regency Hotel walkway failure, or the Cornell computer "worm".

ENGRG 429 Changing Aspects of Engineering Practice (also M&AE 429)
Spring. 3 credits. Prerequisite: upperclass engineering standing. Limited enrollment. Serves as a technical elective but not as a field elective in mechanical engineering.
An introduction to the changing responsibilities of the practicing engineer in an internationally competitive product-development and manufacturing organization. Topics include Total Quality Management, Concurrent Engineering, Design For Quality, Statistical Process Control, Just In Time inventory, and Self-Managed Teams. Marketing, purchasing, financial, and legal issues will also be discussed. Student "companies" will be formed.

Engineering Communications Courses

Courses in this category, offered by the Engineering Communications Program, develop writing and communications skills relevant to engineers.

ENGRC 233/433 Topics in Engineering Communications
TBA. 3 credits.
Topics vary as the need and interest arise. Offerings might include: introductory technical communications, graphic presentation of engineering material, desktop publishing, information technologies, advanced problems in engineering communications, technology and the law.

ENGRC 234/434 Independent Study in Engineering Communications
TBA. Variable credits (1–3). Credit and course level (234 or 434) determined by the amount and intellectual level of the work. Students work closely with a Communications Program instructor to pursue an aspect of professional communications not available through regular course work. Projects may involve writing technical documentation, creating user manuals, analyzing and producing technical graphics, or reading and writing about problems in engineering practice. Interested students should contact the Engineering Communications Program.

ENGRC 301 Writing in Engineering
TBA. 1 credit. Prerequisite: Permission of instructor. Can be used to satisfy requirements in expressive arts as a free or approved elective. *This course can only be taken in conjunction with a "writing-intensive" engineering class.*
Some "writing-intensive" engineering classes may require students to enroll in this supplementary course. Instructors from the Engineering Communications Program work with engineering faculty members to prepare students for writing assignments. Intended to strengthen understanding of the course content while enhancing communications skills. May be taken more than once, with different engineering courses.

ENGRC 350 Engineering Communications
Fall, spring, summer. 3 credits. Limited to 20 students per section. Primarily for juniors and seniors.
D. Adams, P. Beebe, S. Hubbard, S. Youra.
Emphasizes writing, but also includes oral and graphic presentation of technical information. Communications in real-life engineering contexts are analyzed, with case studies and assignments modeled on professional situations. Students learn to adapt language and formats—letters, memoranda, instructions, definitions, proposals, reports—to audiences having different needs and levels of technical expertise. Students also consider the social and ethical implications of the communications they encounter and produce. Taught as a workshop, with ample time for discussion. The goal throughout is clear, well-organized, responsible, and forceful professional communication. Lab fee: $10 to cover photocopying costs.

ENGRC 435 Writing for Engineering Managers
3 credits. Limited to 20 students per section. For juniors and seniors.
S. Hubbard.
Guidance and practice in professional writing and in developing effective responses to case studies that replicate actual problems in industry. Learn techniques for planning and organizing action; controlling and monitoring progress; motivating, leading, coaching, and appraising co-workers; handling organizational power and politics, and managing conflict. Focus on issues such as writing successful proposals, managing engineering teams and projects, and communicating with lawyers, regulators, and the general public.

Introduction to Engineering Courses

Courses in this category are freshman-level courses intended to introduce students to various aspects of engineering. They have no prerequisites and are always cross-listed with a department.

ENGRI 110 The Laser and Its Applications in Science, Technology, and Medicine (also A&EP 110)
Fall, spring. 3 credits.
2 lecs, 1 lab.
The principles of laser action, types of laser systems, elements of laser design, and applications of lasers in science, technology, and medicine are discussed. In the laboratory students build and operate a nitrogen laser and a tunable dye laser. Demonstration experiments with several types of lasers illustrate phenomena such as holography, laser processing of materials, Raman spectroscopy, optical filtering, and interferometry. Guest lectures by prominent medical and industrial scientists introduce students to current fields of laser application and research.

ENGRI 111 Elements of Materials Science and Engineering (also MS&E 111)
Fall. 3 credits.
Relations between atomic structure and macroscopic properties of such diverse materials as metals, ceramics, polymers, and semiconductors. Magnetic, electrical, dielectric superconducting, and mechanical properties are included. Design problems involving microelectronics, superconducting power transmission lines, synthetic bones and joints, ceramic engines, etc.

ENGRI 112 Introduction to Chemical Engineering (also CHEME 112)
Fall, spring. 3 credits. Limited to freshmen.
2 lecs, 1 rec. T. M. Duncan, P. Clancy.
An introduction to the strategies for designing integrated processes based on chemical change with regard to product quality, economics, safety, and environmental issues. Students will learn the scope of chemical engineering and the tools of the trade by (1) studying petrochemical, microelectronic, and biotechnical processing and (2) working on open-ended problems and design projects.

ENGRI 113 Environmental Systems Engineering (also CEE 113)
Fall. 3 credits. Not open to upper-division engineering students, who should take CEE 120 instead.

2 lecs, 1 sec. C. A. Shoemaker.
Analysis and management of environmental systems. Introduction to physical, chemical, and biological processes affecting environmental quality. Environmental modeling and the use of interactive computer graphics. Specific topics include management of water resources, flood control, waste management, ecosystems, and water quality in surface and ground waters.

ENGRI 115 Engineering Application of Operations Research (also OR&IE 115)
Fall, spring. 3 credits.
2 lecs, 1 lab.
Techniques for optimal decision making and engineering design. Computer graphics and mathematical modeling. Allocation of scarce resources, simulation of complex systems, design and analysis of networks, strategies in competitive games. Engineering applications and problem solving will be stressed.

ENGRI 116 Modern Structures (also CEE 116)
Fall, spring. 3 credits.
2 lecs, 1 sec. Fall, G. Deierlein; spring, M. Sansalone.
An introduction to the basic principles of structural engineering and to structural forms. Emphasis is placed on how various types of structures carry loads. Concepts are illustrated by a series of case studies of major structures such as spacecraft, skyscrapers, bridges, shell structures, and dams. The philosophy of engineering design and lessons learned from structural failures are discussed. The Computer-Aided Design Instructional Facility (CADIF) and the Craig Miller Laboratory for Structural Modeling in Hollister Hall are used to demonstrate how engineering materials and structures behave under load. A semester project involves the design and construction of a small balsa-wood bridge.

ENGRI 117 Introduction to Mechanical Engineering (also M&AE 117)
Fall. 3 credits. Consists of two half-term minicourses chosen from a list of three. Two of these minicourses alternate; the third (Drawing and Engineering Design) is offered every half term but has limited enrollment.
2 lecs, 1 lab.
Drawing and Engineering Design (see Engr 102) will enable students without prior mechanical drawing experience to understand and create basic engineering graphics. The other two minicourses provide an introduction to topics of current interest typifying two broad areas within mechanical engineering: fluid and thermal sciences, and mechanical systems and manufacturing. Emphasis is on the practical applications of this knowledge.

[ENGRI 119 Introduction to Manufacturing Engineering (also M&AE 119 and OR&IE 119)
3 credits. Not offered 1992–93.
2 lecs, 1 lab.
Engineering considerations in the design, manufacture, distribution, and service of products. Transformation from functional requirements to material, processing, assembly, and inspection requirements; design and management of manufacturing facilities and distribution channels.]

ENGRI 121 Fission, Fusion, and Radiation (also NS&E 121)
Spring. 3 credits.
2 lecs, 1 lab demonstration.
A lecture, demonstration, and laboratory course on (1) the physical nature and biological effects of nuclear radiation; (2) the benefits and hazards of nuclear energy; (3) light-water reactors, breeder reactors, and fusion reactors; and (4) the uses of nuclear radiation in physical and biological research. The laboratory work and demonstrations involve criticality and the control of Cornell's two research reactors; detection of, and protection against, nuclear radiation; neutron activation analysis using gamma-ray spectroscopy; and plasma sources and devices.

ENGRI 123 Sensors and Actuators
Fall. 3 credits.
2 lecs, 1 lab.
A sensor or an actuator is the element by which information is converted from one form of energy to another. It is the key component in all measurement and control systems. This course will focus on the operational features of a wide variety of sensors and actuators that are used in scientific and engineering metrology, in industrial process control applications, and in consumer products. The devices may be based on electrical, mechanical, acoustical, optical, and thermal phenomena. Students will measure the parameters of various thermo-mechanical sensors and actuators and they will be expected to design, fabricate, and verify the operation of a sensor meeting specific design objectives.

ENGRI 172 Introduction to Artificial Intelligence
Spring. 3 credits. Recommended: COM S 100 or 101, or equivalent computer experience. Enrollment my be limited.
3 lecs, 2 evening exams.
A hands-on introduction to concepts in artificial intelligence. Topics may include heuristic search, game playing, automated theorem proving, natural-language processing, expert systems, neural networks and/or machine learning. Students will use workstation environments to gain software laboratory experience. Interested students need not be proficient programmers to take this class.

ENGRI 181 Engineering in Context (also Science and Technology Studies 181)
Fall. 3 credits. No prerequisites. Illustrated lecs; multimedia lab.
Fundamental engineering principles designed to introduce engineering and other majors to the traditions and practices of the engineering profession and their effects on our culture. (Engineering literacy for non-engineers.) Development of scientific and engineering-design principles in a variety of technological contexts. Overview of the development of engineering as a profession and the evolution of the design process. The relationship between science, technology, and engineering. Civil, mechanical, electrical, chemical, and other engineering project case studies. The implications and uses of information technologies in society.

Engineering Distribution Courses

Courses in this category are sophomore-level courses cross-listed with a department. These courses are intended to introduce students to more advanced concepts of engineering and may require pre- or co-requisites.

ENGRD 201 Introduction to the Physics and Chemistry of the Earth (also GEOL 201)
Spring. 3 credits. Prerequisites: Mathematics 191, Physics 112, and Chemistry 207 or 211.
2 lecs; 1 rec, lab, or field trip.
L. M. Cathles.
Formation of the solar system: accretion and evolution of the earth. The rock cycle: radioactive isotypes and the geological time scale, plate tectonics, rock and minerals, earth dynamics, mantle plumes. The hydrologic cycle: runoff, floods and sedimentation, groundwater flow, contaminant transport. Weathering cycle: chemical cycles, CO_2 (weathering), salt cycle, controls on global temperature (CO_2 or salt), oil and mineral resources.

ENGRD 202 Mechanics of Solids (also T&AM 202)
Fall, spring. 3 credits. Prerequisite: coregistration in Mathematics 293.
2 lecs, 1 rec, 4 labs each semester, evening exams.
Principles of statics, force systems, and equilibrium; frameworks; mechanics of deformable solids, stress, strain, statically indeterminate problems; mechanical properties of engineering materials; axial force, shearing force, bending moment, plane stress; Mohr's circle; bending and torsion of bars; buckling and plastic behavior.

ENGRD 203 Dynamics (also T&AM 203)
Fall, spring. 3 credits. Prerequisite: coregistration in Mathematics 294.
2 lecs, 1 rec, 4 labs each semester, evening exams.
Newtonian dynamics of a particle, systems of particles, a rigid body. Kinematics, motion relative to a moving frame. Impulse, momentum, angular momentum, energy. Rigid-body kinematics, angular velocity, moment of momentum, the inertia tensor. Euler equations, the gyroscope.

ENGRD 210 Introduction to Electrical Systems (also ELE E 210)
Fall, spring. 3 credits. Prerequisites or corequisites: Mathematics 294 and Physics 213.
3 lecs and optional tutorial secs.
Circuit elements and laws, analysis techniques, operational amplifiers. Response of linear systems, with an introduction to complex frequency and phasors, forced response, average power, transfer function, pole-zero concepts, and the frequency spectrum. Terminal characteristics of diodes and transistors, linear models, bias circuits, and frequency response of small-signal amplifiers.

ENGRD 211 Computers and Programming (also COM S 211)
Fall, spring, summer. 3 credits. Prerequisite: COM S 100 or equivalent programming experience.
2 lecs, 1 rec, 2 evening exams.
Intermediate programming in a high-level language and introduction to computer science. Topics include program development, proofs of program correctness, program structure, recursion, abstract data types, data structures, and analysis of algorithms. Pascal is the principal programming language.

ENGRD 219 Mass and Energy Balances (also CHEME 219)
Fall. 3 credits. Co-requisite: physical or organic chemistry 220.
A. Panagiotopoulos.

Engineering problems involving material and energy balances. Batch and continuous reactive systems in the steady and unsteady states. Introduction to phase equilibria for multicomponent systems. Humidification processes.

ENGRD 221 Thermodynamics (also M&AE 221)
Fall, spring. 3 credits. Prerequisites: Mathematics 192 and Physics 112.
3 lecs.
The definitions, concepts, and laws of thermodynamics. Applications to ideal and real gases, multiphase pure substances, gaseous reactions. Heat-engine and heat-pump cycles, with an introduction to energy-conversion systems.

ENGRD 222 Introduction to Scientific Computation (also COM S 222)
Spring. 3 credits. Prerequisites: COM S 100 and prerequisite or corequisite of Mathematics 221 or 293.
2 lecs, 3 evening exams.
Students write MATLAB/FORTRAN programs to solve representative problems from elementary calculus. Emphasis is on the design of numerical software that is efficient, reliable, stable, and portable. Special topics include supercomputing and parallel computation.

ENGRD 230 Introduction to Digital Systems (also ELE E 230)
Fall, spring. 4 credits. Prerequisite: CS 100.
2 lecs, 5 lab experiments.
Introduction to design techniques and methodologies of digital and computer systems. Computer structure and arithmetic, switching algebra and combinational circuit design, integrated circuits and modules, memory systems and sequential circuits, processor design.

ENGRD 241 Engineering Computation (also CEE 241)
Fall, spring. 3 credits. Prerequisites: COM S 100 and Mathematics 293. Co-requisite: Mathematics 294.
2 lecs, 1 rec, 2 evening exams. P.L.-F Liu, J. F. Abel.
This course introduces the discipline of numerical methods while developing both FORTRAN and spreadsheet programming proficiency. The art of top-down, modular program design is illustrated with engineering applications. Included are numerical methods for solving engineering problems such as Taylor-series approximations, truncation and round-off errors, roots of functions, solution of simultaneous linear equations, interpolation, numerical differentiation and integration, the solution of ordinary differential equations, and the context and solution of partial differential equations. Applications are drawn from different areas of engineering.

ENGRD 260 Introductory Engineering Probability (also OR&IE 260)
Fall, spring. 3 credits. Prerequisite: first-year calculus.
3 lecs.
The basic tools of probability and their use in engineering. This may (but need not) be followed by OR&IE 361, Introductory Engineering, Stochastic Processes I, or by OR&IE 370, Introduction to Statistical Theory with Engineering Applications. Definition of probability; random variables; probability distributions, density functions, expected values; jointly distributed random variables; distributions such as the binomial, Poisson, and exponential that are important in engineering and how they arise in practice; limit theorems.

ENGRD 261 Introduction to Mechanical Properties of Materials (also MS&E 261)
Fall, spring. 3 credits.
2 lecs, 1 rec or lab.
The relation of elastic deformation, plastic deformation, and fracture properties to structure and defects on a microscopic scale in metals, ceramics, polymers, and composite materials. Design and processing of materials to achieve high modulus, damping capacity, hardness, fracture strength, creep resistance, or fatigue resistance. Flaw-tolerant design methods using fracture mechanics.

ENGRD 262 Introduction to Electrical Properties of Materials (also MS&E 262)
Spring. 3 credits.
2 lecs, 1 rec or lab.
Electrical and structural properties of semiconductors, the operation of p-n junctions and transistors, and the processing methods used to form modern integrated circuits. Electrical conduction in metal films, semiconductors, bipolar and field-effect transistors and light-emitting diodes. Diffusion, ion implantation, oxidation, metallization, and other process steps in fabricating semiconductor devices. Interplay between structural and electrical properties and their application to the design of semiconductor devices and integrated circuits.

ENGRD 264 Computer-Instrumentation Design (also A&EP 264)
Fall, spring. 3 credits. Prerequisites: Engr 100 or COM S 100.
1 lec, 1 lab.
This course covers the use of a small computer in an engineering or scientific research laboratory. Various experiments will be performed using an IBM-AT style computer (25MHz 80386, color graphics) running MS-DOS. The experiments and devices to be investigated include: input and output ports, analog-to-digital converters (ADC), digital-to-analog converters (DAC), thermistors, optical sensors, temperature control, least-squares curve fitting of experimental data, stepping motors, thermal diffusion, and viscosity of fluids. Computer control, data acquisition, and data analysis (graphical and numerical) will be investigated in these experiments using Pascal and machine language programming as well as commercial graphics program packages. At the level of *IBM-PC in the Laboratory,* by B. G. Thompson and A. F. Kuckes.

ENGRD 270 Basic Engineering Probability and Statistics (also OR&IE 270)
Fall, spring. 3 credits. Students who intend to enter the upperclass Field Program in Operations Research and Engineering should take Engr 260 instead of this course. Prerequisite: first-year calculus.
3 lecs, evening prelims.
This course should give students a working knowledge of basic probability and statistics as they apply to engineering work. For students who want greater depth, a course in probability (OR&IE 260) followed by a course in statistics (OR&IE 370) is recommended.

AGRICULTURAL AND BIOLOGICAL ENGINEERING

Courses in agricultural and biological engineering will be found in the section listing the offerings of the College of Agriculture and Life Sciences.

APPLIED AND ENGINEERING PHYSICS

A&EP 110 The Laser and Its Applications in Science, Technology, and Medicine (also ENGRI 110)
Fall, spring. 3 credits. This is a course in the Introduction to Engineering series.
2 lecs, 1 lab.
For description see Engineering Common Courses.

A&EP 264 Computer-Instrumentation Design (also ENGRI 264)
Fall, spring. 3 credits. Prerequisites: Engr 100 or COM S 100.
1 lec, 1 lab.
For description see Engineering Common Courses.

A&EP 303 Introduction to Nuclear Science and Engineering I (also NS&E 303)
Fall. 3 credits. Prerequisite: Physics 214 or Mathematics 294.
3 lecs.
For description see NS&E 303.

A&EP 321 Mathematical Physics I
Fall. 4 credits. Prerequisite: Math 294. Intended for upper-level undergraduates in the physical sciences.
4 lecs.
Review of vector analysis; complex variable theory, Cauchy-Rieman conditions, complex Taylor and Laurent series, Cauchy integral formula and residue techniques, conformal mapping; Fourier Series; Fourier and Laplace transforms; ordinary differential equations; separation of variables. Texts: *Mathematical Methods for Physicists,* by Arfken; *Mathematical Physics,* by Butkov.

A&EP 322 Mathematical Physics II
Spring. 4 credits. Prerequisite: A&EP 321. Second of the two-course sequence in mathematical physics intended for upper-level undergraduates in the physical sciences.
4 lecs.
Partial differential equations, Bessel functions, spherical harmonics, separation of variables, wave and diffusion equations, Laplace, Helmholtz and Poisson's Equations, transform techniques, Green's functions; integral equations, Fredholm equations, kernals; complex variables, theory, branch points and cuts, Riemann sheets, method of steepest descent; tensors, contravariant and covariant representations; group theory, matrix representations, class and character. Texts: *Mathematical Methods for Physicists,* by Arfken; *Mathematical Physics,* by Butkov.

A&EP 333 Mechanics of Particles and Solid Bodies
Fall, summer. 4 credits. Prerequisites: Physics 112 or 116 and coregistration in A&EP 321 or equivalent or permission of instructor.
3 lecs, 1 rec.
Newton's mechanics; linear oscillations; Lagrangian and Hamiltonian formalism for generalized coordinates and constrained

motion; non-inertial reference systems; central-force motion; motion of rigid bodies; small vibrations in multi-mass systems; nonlinear oscillations; basic introduction to relativistic mechanics. Emphasis on physical concepts and applications. (On the level of *Classical Dynamics*, by Marion).

A&EP 355 Intermediate Electromagnetism
Fall, summer. 4 credits. Prerequisites: Physics 214 or 217 and coregistration in A&EP 321 or equivalent, or permission of instructor.
3 lecs, 1 rec.
Topics: vector calculus, electrostatics, magnetostatics, and induction phenomena; solutions to Laplace's equation in various geometries, electric and magnetic materials, electric and magnetic forces, energy storage, and skin-effect, quasistatics. Emphasis on physical concepts and applications to design of high-voltage generators, electron guns, and particle accelerators.

A&EP 356 Intermediate Electrodynamics
Spring. 4 credits. Prerequisite: A&EP 355 and coregistration in A&EP 322 or equivalent, or permission of instructor.
3 lecs, 1 rec.
Topics: electromagnetic wave phenomena, transmission lines, waveguides, dispersive media, scattering, radiation, reciprocity, physical optics, special relativity. Emphasis on physical concepts and their application to the design of microwave circuits, antenna arrays, and optically coupled systems.

A&EP 361 Introductory Quantum Mechanics
Spring. 4 credits. Prerequisites: A&EP 333 or Physics 318; coregistration in A&EP 322 or equivalent and in A&EP 356 or Physics 326.
3 lecs, 1 rec.
A first course in the systematic theory of quantum phenomena. Topics include the harmonic oscillator, the Dirac formalism, angular momentum, the hydrogen atom, and perturbation theory.

A&EP 363 Electronic Circuits (also Physics 360)
Fall, spring, summer. 4 credits. Prerequisite: Physics 208 or 213 or permission of instructor; no previous experience with electronics is assumed. Fall term is generally less crowded.
1 lec, 2 labs.
Analyze, design, build, and test circuits used in scientific and engineering instrumentation (with discrete components and integrated circuits). Analog circuits: resistors, capacitors, operational amplifiers (linear amplifiers, oscillators, comparators and Schmitt triggers), filters, diodes and transistors. Digital circuits: combinatorial and sequential logic (gates, flip-flops, counters, shift registers, timers, one shots). Computer interfacing introduced and used to investigate digital-to-analog (DAC) and analog-to-digital conversion (ADC) techniques. DOS, Pascal, and machine language used. At the level of *The Art of Electronics*, by Horowitz and Hill.

A&EP 423 Statistical Thermodynamics
Fall. 4 credits. Prerequisite: Introductory three-semester physics sequence plus one year of junior-level mathematics.
3 lecs, 1 rec.
Quantum statistical basis for equilibrium thermodynamics, microcanonical, canonical and grand canonical ensembles, and partition functions. Quantum and classical ideal gases and paramagnetic systems. Fermi-Dirac, Bose-Einstein, and Maxwell-Boltzmann statistics. Introduction to systems of interacting particles. At the level of *Thermal Physics*, by Kittel and Kroemer, and *Statistical Physics*, by Rosser.

A&EP 434 Continuum Physics
Spring. 4 credits. Prerequisites: A&EP 333 and 356 or equivalent.
3 lecs, 1 rec.
Local conservation laws; stress, strain, and rate-of-strain tensors; equations of motion for elastic and viscous response; waves in solids and fluids; dislocations; ideal fluids, potential flow, Bernouli's equation, vorticity and circulation, lift; viscous incompressible flow and the Navier-Stokes equations, Reynolds number, Poiseuille flow in a pipe, Stokes drag on a sphere; boundary layers, Blasius equations; flow instabilities, Rayleigh-Benard convection and the onset of chaotic flow. Introduction to turbulent flow.

A&EP 436 Physical and Integrated Optics
Spring. 4 credits. Prerequisites: A&EP 355, A&EP 361, or equivalent or co-registration in A&EP 361.
3 lecs, 1 lab.
The fundamentals of optics: diffraction, polarization, interference, birefringence, scattering, Fourier optics. Applications to optical waveguides, nonlinear optics, integrated optics, optical storage, coherent detection, optical communications. Emphasis on hands-on experimental laboratory demonstrations and computer synthesis of optical phenomena.

A&EP 438 Computational Engineering Physics
Spring. 3 credits. Prerequisites: CS 100, A&EP 321, 333, 355, 361, or equivalent, or permission of instructor; co-registration in 361.
2 lecs, plus computer lab.
Numerical computation (derivatives, integrals, differential equations, matrices, boundary-value problems, relaxation, etc.) will be introduced and applied to engineering physics problems that cannot by solved analytically (three-body problem, electrostatic fields, quantum energy levels, etc.). FORTRAN programming will be introduced (C or Pascal optional). Some prior exposure to programming assumed but no previous experience with FORTRAN assumed. (Two floppy disks required, $2.)

A&EP 484 Introduction to Controlled Fusion: Principles and Technology (also ELE E 484, M&AE 559, and NS&E 484)
Spring. 3 credits. Prerequisites: Physics 112, 213, and 214, or equivalent background in electricity and magnetism and mechanics, and permission of instructor. Intended for seniors and graduate students.
3 lecs.
For description see NS&E 484.

A&EP 490 Informal Study in Engineering Physics
Credit to be arranged.
Laboratory or theoretical work in any branch of engineering physics under the direction of a member of the staff. The study can take a number for forms; for example, design of laboratory apparatus, performance of laboratory measurements, or theoretical design or analysis. Details to be arranged with respective faculty member.

A&EP 606 Introduction to Plasma Physics (also ELE E 581)
Fall. 4 credits. First-year graduate-level course; open also to exceptional seniors with permission of instructor. Prerequisites: A&EP 355 or 356, or EE 303 and 304, or equivalent.
3 lecs.
Plasma state; motion of charged particles in fields; drift-orbit theory; coulomb scattering, collisions; ambipolar diffusion; elementary-transport theory; two-fluid and hydromagnetic equations; plasma oscillations and waves, CMA diagram; hydromagnetic stability; elementary applications to space physics and controlled fusion.

A&EP 607 Advanced Plasma Physics (also ELE E 582)
Spring. 4 credits. Prerequisite: A&EP 606/ ELE E 581.
3 lecs.
Boltzmann and Vlasov equations; dielectric tensor; waves in hot magnetized plasma; Landau and cyclotron damping; microinstabilities; drift waves, low-frequency stability; test particles, Cerenkov emission; fluctuations; collisional effects; applications.

A&EP 608 Cosmic Electrodynamics (also Astronomy 660)
Spring. 2 credits.
Hours to be arranged. R. Lovelace.
Selected topics discussed in detail: the solar corona and wind; extragalactic radio sources; magnetized accretion discs and modes and instabilities of self-gravitating systems.

A&EP 609 Low-Energy Nuclear Physics
Fall. 4 credits. Prerequisite: an introductory course in modern physics, including quantum mechanics.
3 lecs.
The nuclear interaction. Properties of ground and excited states of nuclei; models of nuclear structure; alpha, beta, gamma radioactivity; low-energy nuclear reactions—resonant and nonresonant scattering, absorption, and fission. At the level of *Introduction to Nuclear Physics*, by Enge.

A&EP 612 Nuclear Reactor Theory
Fall. 4 credits. Prerequisites: a year of advanced calculus and some nuclear physics.
3 lecs.
Physical theory of fission reactors. Fission and neutron interactions with matter; theory of neutron diffusion; slowing down and thermalization; calculations of criticality and neutron-flux distribution in nuclear reactors. Reactor kinetics. At the level of *Nuclear Reactor* Theory, by Lamarsh.

A&EP 615 Membrane Biophysics
To be arranged. 3 credits.
Molecular structure and supramolecular organization of cell membranes. Model membranes and membrane models. Molecular mechanisms of membrane transport, electrophysiology and cell-cell interaction, molecular channels. Receptors and transmembrane ion channels, molecular basis for Hodgkin-Huxley theory, single-channel recording, sensory transduction mechanisms. Physical probes of membrane processes. Dynamics of membrane processes, lateral mobility, diffusion, and flow. Some current problems in cell-surface function and organization of specialized membrane macrostructures.

A&EP 633 Nuclear Engineering
Fall. 4 credits. Prerequisite: introductory course in nuclear engineering.

The fundamentals of nuclear reactor engineering, reactor siting and safety, fluid flow and heat transfer, control, environmental effects, and radiation protection.

A&EP 634 Nuclear Engineering Design Seminar
Spring. 4 credits. Prerequisite: A&EP 633.
A group design study of a selected nuclear system. Emphasis is on safety, siting, and radiation protection in the design of nuclear systems.

A&EP 636 Seminar on Thermonuclear Fusion Reactors
Fall. 3 credits. Prerequisite: basic course in plasma physics or nuclear reactor engineering, or permission of instructor. Offered alternate years.
Analysis of various technological and engineering problems in design and construction of fusion reactors. Topics include basic reactor schemes, materials, mechanical and heat-transfer problems, radiation and safety, superconducting magnets, energy conversion, plasma impurities, and economics.

A&EP 638 Intense Pulsed Electron and Ion Beams: Physics and Technology
Spring. 2 credits. Prerequisites: A&EP 606 (ELE E 581) and 607 (ELE E 582) or equivalent, or permission of instructor. Offered alternate years.
Topics include (1) theoretical aspects of intense electron and ion beams, such as equilibria and stability; (2) technology of intense beam production, such as pulsed-power generator principles, and electron and ion diode operation; and (3) applications of intense beams, such as to controlled fusion, microwave generation, and laser pumping. Extensive discussion of experimental results.

A&EP 651 Nuclear Measurements Laboratory
Spring. 4 credits. Prerequisite: A&EP 609 or equivalent. Primarily for graduate students in nuclear fields. A less-intensive related course, NS&E 551, which has the same lecture but has only one lab period, is intended for students in non-nuclear fields in which nuclear methods are used
One 2-hour lecture and two two-and-a-half-hour labs. D. D. Clark.
Lectures on interaction of radiation with matter, radiation protection, and nuclear instruments and methods. About fifteen experiments are available in radiation detection, attenuation, and measurement; electronic instrumentation, including computerized systems; activation analysis; neutron radiography; neutron moderation and reactor physics; neutron diffraction; and low-energy nuclear physics with neutron beams. The TRIGA reactor and the Zero Power Reactor critical facility are used. Students select seven or eight experiments to meet their interests and needs. At the level of *Radiation Detection and Measurement*, by Knoll.

A&EP 661 Microcharacterization
Fall. 3 credits. Prerequisites: introductory three-semester physics sequence or an introductory course in modern physics.
The basic physical principles underlying the many modern microanalytical techniques available for characterizing materials from volumes less than a cubic micron. Discussion centers on the physics of the interaction process by which the characterizatation is performed, the methodology used in performing the characterization, the advantages and limitations of each technique, and the instrumentation involved in each characterization method.

A&EP 662 Microprocessing and Microfabrication of Materials
Spring. 3–4 credits (3 credits plus 1 credit for optional laboratory).
Several field trips.
An introduction to the fundamentals of fabricating and patterning thin-film materials and surfaces, with emphasis on electronic materials. Vacuum and plasma thin-film deposition processes. Photon, electron, X-ray, and ion-beam lithography. Techniques for pattern replication by plasma and ion processes. Emphasis is on understanding the physics and materials science that define and limit the various processes.

A&EP 681–689 Special Topics in Applied Physics
Topics, instructors, and credits to be announced each term. Typical topics include quantum superconducting devices, physics of submicron conductors, nonlinear fluctuators, biophysical processes, molecular fluorescence.

A&EP 711 Principles of Diffraction (also MS&E 610)
Spring. 4 credits. Offered alternate years.
Introduction to diffraction phenomena as applied to solid-state problems. Scattering and absorption of neutrons, electrons, and X-ray beams, with particular emphasis on synchrotron radiation X-ray sources. Diffraction from two- and three-dimensional periodic lattices. Fourier representation of scattering centers and the effect of thermal vibrations. Diffraction from almost periodic structures, surface layers, gases, and amorphous materials. Survey of dynamical diffraction from perfect and imperfect lattices. Several laboratory experiments will be conducted.

A&EP 751/752 Project
751, fall; 752, spring. Credit to be arranged. Required for candidates for the M.Eng. (Engineering Physics) degree.
Informal study under the direction of a member of the university faculty. Students are offered research experience through work on a special problem related to their field of interest.

A&EP 753 Special Topics Seminar in Applied Physics
Fall. 4 credits. Prerequisite: undergraduate physics. Required for candidates for the M.Eng. (Engineering Physics) degree and recommended for seniors in engineering physics.
Special topics in applied science, with focus on areas of applied physics and engineering that are of current interest. Subjects chosen are researched in the library and presented in a seminar format by the students. Effort is made to integrate the subjects within selected subject areas such as atomic, biological, computational, optical, plasma, and solid-state physics, or microfabrication technology, as suggested by the students and coordinated by the instructor.

A&EP 761 Kinetic Theory (also ELE E 681)
Fall. 3 credits. Prerequisite: ELE E 407, Physics 561, or permission of instructor. Offered alternate years.
2 lecs.
For description see ELE E 681.

CHEMICAL ENGINEERING

CHEME 101 Nonresident Lectures
Spring. No credit.
1 lec. G. F. Scheele and guest lecturers.
Given by lecturers invited from industry and from selected departments of the university to assist students in their transition from college to industrial life.

CHEME 112 Introduction to Chemical Engineering (also ENGR 112)
Fall, spring. 3 credits. Limited to freshmen.
2 lecs, 1 rec. T. M. Duncan, P. Clancy.
For description see Engineering Common Courses.

CHEME 219 Mass and Energy Balances (also ENGRD 219)
Fall. 3 credits. Corequisite: physical or organic chemistry or permission of instructor.
3 lecs. 1 computing session.
A. Panagiotopoulos.
For description see Engineering Common Courses.

CHEME 313 Chemical Engineering Thermodynamics
Fall. 4 credits. Corequisite: physical chemistry.
4 lecs, 1 computing session.
K. E. Gubbins.
A study of the first and second laws, with application to batch and flow processes. Thermodynamic properties of fluids; applications of thermodynamics to compressors, power cycles, refrigeration; thermodynamic analysis of processes. Thermodynamics of mixtures, phase equilibria and phase diagrams. Estimation methods. Heat effects, chemical equilibria.

CHEME 323 Fluid Mechanics
Fall. 3 credits. Prerequisites: CHEME 219 and engineering mathematics sequence.
3 lecs, 1 computing session. D. L. Koch.
Fundamentals of fluid mechanics. Macroscopic and microscopic balances. Applications to problems involving viscous flow.

CHEME 324 Heat and Mass Transfer
Spring. 3 credits. Prerequisite: CHEME 323.
3 lecs, 1 computing session. P. H. Steen.
Fundamentals of heat and mass transfer. Macroscopic and microscopic balances. Applications to problems involving conduction, convection, and diffusion.

CHEME 332 Analysis of Separation Processes
Spring. 4 credits. Prerequisites: CHEME 313 and 323.
3 lecs, 1 computing session. G. F. Scheele.
Analysis of separation processes involving phase equilibria and mass transfer; some use of the digital computer. Phase equilibria; binary, multicomponent, and extractive distillation; liquid-liquid extraction; gas absorption.

CHEME 390 Reaction Kinetics and Reactor Design
Spring. 3 credits. Prerequisites: CHEME 313 and 323.
3 lecs, 1 computing session. M. L. Shuler.
A study of chemical reaction kinetics and principles of reactor design for chemical processes.

CHEME 432 Chemical Engineering Laboratory
Fall. 4 credits. Prerequisites: CHEME 323, 324, 332, and 390.
3 lecs, 1 lab. G. F. Scheele.

Laboratory experiments in fluid dynamics, heat and mass transfer, kinetics, other operations. Correlation and interpretation of data. Technical report writing.

CHEME 462 Chemical Process Design
Spring. 4 credits. Prerequisite: CHEME 432.
R. P. Merrill.
A consideration of process and economic alternatives in selected chemical processes; design and assessment.

CHEME 472 Process Control
Spring. 3 credits. Prerequisites: CHEME 324 and 390.
3 lecs, 1 lab.
Analysis of the dynamics of chemical processes and design of feedback and feedforward control systems. Laplace tranform techniques; stability analysis; frequency-response analysis. An introduction to multivariable control. The laboratory includes experiments on transient response, frequency response, controller tuning, and discussions of typical process instrumentation.

CHEME 481 Biomedical Engineering
Fall. 3 credits. Prerequisite: CHEME 324 or equivalent or permission of instructor.
3 lecs. D. A. Hammer.
Special topics in biomedical engineering, including cell separations, blood flow, design of artificial devices, biomaterials, image analysis, biological transport phenomena, pharmacokinetics and drug delivery, and analysis of physiological processes such as adhesion, mobility, secretion, and growth.

CHEME 490 Undergraduate Projects in Chemical Engineering
Fall, spring. Variable credit.
Research or studies on special problems in chemical engineering.

CHEME 564 Design of Chemical Reactors
Spring. 3 credits. Prerequisite: CHEME 390 or equivalent.
3 lecs. P. Harriott.
Design, scale-up, and optimization of chemical reactors with allowance for heat and mass transfer and nonideal flow patterns. Homework problems feature analysis of data for gas-solid, gas-liquid, and three-phase reaction systems.

CHEME 565 Design Project
Fall, spring. 3 or 6 credits. Required for students in the M.Eng.(Chemical) program.
Staff.
Design study and economic evaluation of a chemical processing facility, alternative methods of manufacture, raw-material preparation, food processing, waste disposal, or some other aspect of chemical processing.

[CHEME 566 Systematic Methods for Process Design
Spring. 3 credits. Prerequisite: CHEME 332 or equivalent. Not offered 1992–93.
3 lecs.
An introduction to the synthesis and use of computer systems for steady-state simulation of chemical processes. Systematic design methods for vapor-liquid processes, including synthesis methods for separation systems and heat exchanger networks.]

CHEME 590 Special Projects in Chemical Engineering
Fall, spring. Variable credit. Limited to graduate students.
Non-thesis research or studies on special problems in chemical engineering.

CHEME 640 Polymeric Materials
Spring. 3 credits.
3 lecs. F. Rodriguez.
Chemistry and physics of the formation and characterization of polymers. Principles of fabrication.

CHEME 642 Polymeric Materials Laboratory
Spring. 2 or 3 credits. Prerequisite: CHEME 640.
F. Rodriguez.
Experiments in the formation, characterization, fabrication, and testing of polymers.

CHEME 643 Introduction to Bioprocess Engineering
Fall. 3 credits. Prerequisite: CHEME 390 or permission of instructor. No prior background in the biological sciences required.
3 lecs. M. L. Shuler.
A discussion of principles involved in using microorganisms, tissue cultures, and enzymes for processing. Application to food, fermentation, and pharmaceutical industries and to biological waste treatment.

[CHEME 645 Advanced Concepts in Biological Engineering
Spring. 3 credits. Prerequisite: CHEME 643 or equivalent or permission of instructor. Not offered 1992–93.
3 lecs. D. A. Hammer.
Fundamentals of biochemical and biomedical engineering, with additional emphasis on cell and membrane biophysics. Topics include cell-surface receptor phenomena, protein diffusion, cell adhesion, membrane biophysics, cell motility, mathematical immunology, cell growth, enzyme catalysis, bioseparation, and genetically modified organisms.]

[CHEME 648 Polymers in Electronics and Related Areas
Spring. 3 credits. Prerequisite: 640 or permission of instructor. Not offered 1992–93.
3 lecs. F. Rodriguez.
Applications of polymers as resists for microlithography, as insulators, and as conductors. Radiation effects, polymer synthesis, and surface characterization. Additional special topics may be covered.]

CHEME 650 Reaction and Transport in Gas-Solid Systems
Spring. 3 credits. Prerequisite: CHEME 390 or permission of instructor.
3 lecs. J. R. Engstrom and A. B. Anton.
Analysis of processes for materials synthesis and modification that involve gas-solid interactions, including chemical-vapor deposition, plasma etching, and heterogeneous catalysis. Focuses on the physiochemical processes that underlie these technologies, including mechanisms of vapor transport; energy and heat transfer; thermodynamic relationships between the vapor, adsorbed and solid phases; and both homogeneous and heterogeneous reaction kinetics.

CHEME 656 Separations Using Membranes or Porous Solids
Spring. 3 credits. Prerequisites: ChemE 324 and 332.
3 lecs. P. Harriott.
Diffusion of small molecules in gases, liquids, and solids. Membrane separation processes including gas separation, pervaporation, reverse osmosis, and ultrafiltration. Purification of gases and liquids by adsorption, ion exchange, and chromatography.

CHEME 661 Air Pollution Control
Fall. 3 credits.
3 lecs. P. Harriott.
Origin of air pollutants. Design of equipment for removal of particulate and gaseous pollutants formed in combustion and chemical processing.

[CHEME 673 Adsorption and Reactions on Chemically Reactive Solids
Fall. 3 credits. Not offered 1992–93.
3 lecs. R. P. Merrill.
The physics and chemistry of reactions at solid surfaces are presented in molecular detail. The emphasis is on the use of modern spectroscopic techniques to determine the geometric structure, electronic properties, and reaction sequences on well-defined surfaces. Examples from the preparation of optoelectronic materials and from catalysis will be given to illustrate the concepts and principles presented.]

CHEME 675 Synthetic Polymer Chemistry (also MS&E 671 and Chemistry 671)
Fall. 4 credits. Prerequisites: Chem 359–360 or equivalent or permission of instructor. MS&E 620 is recommended.
3 lecs. J. M. J. Frechet.
For description see Chemistry 671.

CHEME 681 Dynamics of Colloidal Systems
Fall. 3 credits. Prerequisite: basic understanding of thermodynamics and fluid dynamics. Offered alternate years.
3 lecs. A. Z. Panagiotopoulos and W. L. Olbricht.
Fundamental descriptions of colloidal systems under equilibrium and non-equilibrium conditions. Phase equilibria of surfactant systems, thermodynamics of micelle formation, forces between colloidal particles, electrokinetic phenomena, flocculation and aggregation, transport of surfactant in interfacial systems, stability of emulsions, and dynamics of thin films. Open to advanced undergraduates and graduate students from all fields.

CHEME 711 Advanced Chemical Engineering Thermodynamics
Fall. 3 credits. Prerequisite: CHEME 313 or equivalent.
3 lecs. P. Clancy.
Postulatory approach to thermodynamics. Legendre transformations. Equilibrium and stability of general thermodynamic systems. Applications of thermodynamic methods to advanced problems in chemical engineering. Introduction to statistical mechanical ensembles, phase transitions, Monte Carlo methods, and theory of liquids.

CHEME 713 Chemical Kinetics and Dynamics
Fall. 3 credits. Prerequisite: CHEME 390 or equivalent.
3 lecs. J. R. Engstrom.
Microscopic and macroscopic viewpoints. Connections between phenomenological chemical kinetics and molecular reaction dynamics. Reaction cross sections, potential energy surfaces, and dynamics of bimolecular collisions. Molecular beam scattering. Transition state theory. Unimolecular reaction dynamics. Complex chemically reacting systems: reactor stability, multiple steady states, oscillations, and bifurcation. Reactions in heterogeneous media. Free-radical mechanisms in combustion and pyrolysis.

CHEME 721 Thermodynamics and Phase Change Heat Transfer (also M&AE 652)
Spring. 4 credits. Prerequisite: graduate standing or permission of instructor.
C. T. Avedisian.
For description see M&AE 652.

CHEME 731 Advanced Fluid Mechanics and Heat Transfer
Fall. 3 credits. Prerequisites: CHEME 323 and 324 or equivalent.
3 lecs. D. L. Koch.
Derivation of the equations of motion for Newtonian fluids. Low Reynolds number fluid dynamics, lubrication theory, inviscid fluid dynamics. Boundary layer theory. Convective and conductive heat transfer.

CHEME 732 Diffusion and Mass Transfer
Spring. 2 credits. Prerequisite: CHEME 731 or equivalent.
2 lecs. D. A. Hammer.
Conservation equations in multicomponent systems, irreversible thermodynamics, dispersion, and Brownian diffusion. Mass transfer for convective diffusion in liquids. Application to a variety of problems such as coagulation of aerosols, diffusion through films and membranes, liquid-liquid extraction, chemical vapor deposition.

CHEME 734 Fluid Mechanics of Suspensions
Spring. 3 credits. Prerequisites: CHEME 731, M&AE 601, or equivalent. Offered alternate years.
D. L. Koch.
Relationship between macroscopically observed transport and rheological behavior of suspensions and composites, and underlying transport processes occurring on the particle-length scale. Methods of treating interparticle hydrodynamic interactions. Derivation of macroscopic properties using ensemble averages, renormalization, and dynamic simulations. Applications will include free suspensions of solid spheres, fibers, and bubbles; composite solids; and porous media.

CHEME 741 Selected Topics in Biochemical Engineering
Fall, spring. 1 credit (may be repeated for credit). Prerequisite: CHEME 643 or permission of instructor.
D. A. Hammer, M. L. Shuler.
Discussion of current topics and research in biochemical engineering for graduate students.

[CHEME 745 Physical Polymer Science I
Fall. 3 credits. Prerequisite: CHEME 711 or equivalent. Offered alternate years. Not offered 1992–93.
C. Cohen.
Thermodynamic properties of dilute, semidilute, and concentrated solutions from both classical and scaling approaches. Characterization techniques of dilute solutions: osmometry, light scattering, viscometry, and sedimentation. Rubber elasticity; mechanical and thermodynamic properties of gels. Polymer melts: equations of state and glass transition phenomena.]

CHEME 751 Mathematical Methods of Chemical Engineering Analysis
Spring. 4 credits.
3 lecs. P. H. Steen.
Application of advanced mathematical techniques to chemical engineering analysis. Mathematical modeling, scaling, regular and singular perturbation, multiple scales, asymptotic analysis. Linear and nonlinear ordinary differential equations, partial differential equations.

CHEME 753 Analysis of Nonlinear Systems: Stability, Bifurcation, and Continuation
Fall. 3 credits. Prerequisite: CHEME 751 or equivalent. Offered alternate years. Offered 1992–93.
3 lecs. P. H. Steen, T. J. Healey.
Elements of bifurcation theory. Branch-following techniques. Stability of discrete and continuous systems. Application to population-dynamics, reaction-diffusion, and hydrodynamic systems using software for continuation problems.

[CHEME 772 Theory of Molecular Liquids
Spring. 3 credits. Prerequisite: CHEME 711 or equivalent. Offered alternate years. Not offered 1992–93.
K. E. Gubbins.
Theory of intermolecular forces, and equilibrium statistical mechanics for nonspherical molecules. Distribution functions. Applications to thermodynamics of such fluids using integral equation and perturbation theory techniques. Mixture properties, phase diagrams for mixtures with polar or quadrupolar components. Surface properties.]

CHEME 774 Atomistic Simulation of Materials
Spring. 3 credits. Prerequisite: Competence in FORTRAN, PASCAL, or C. Prior knowledge of statistical mechanics helpful. Offered alternate years.
2 lecs, 1 computer lab.
A. Panagiotopoulos.
The statistical mechanical theory behind Monte-Carlo and molecular-dynamics computer-simulation techniques. Strong emphasis is placed on students writing their own MC and MD code. Calculation of distribution functions, thermodynamic, kinetic and structural properties. Introduction to the application of computer graphics to simulation. Interparticle forces and application of atomistic simulation of systems containing metals, semiconductors, and biological materials. Issues of code efficiency and vectorization.

CHEME 790 Seminar
Fall, spring. 1 credit each term.
General chemical engineering seminar required of all graduate students in the Field of Chemical Engineering.

CHEME 792 Advanced Seminar in Thermodynamics
Fall, spring. 1 credit.
K. E. Gubbins, A. Panagiotopoulos.
A forum for talks by graduate students and faculty members on topics of current interest in thermodynamics and statistical mechanics.

CHEME 890 Thesis Research
Fall, spring. Variable credit.
Thesis research for the M.S. degree in chemical engineering.

CHEME 990 Thesis Research
Fall, spring. Variable credit.
Thesis research for the Ph.D. degree in chemical engineering.

CIVIL AND ENVIRONMENTAL ENGINEERING

General

CEE 113 Environmental Systems Engineering (also ENGRI 113)
Fall. 3 credits.
2 lecs, 1 sec. C. A. Shoemaker.
For description see Engineering Common Courses.

CEE 116 Modern Structures (also ENGRI 116)
Fall, spring. 3 credits.
2 lecs, 1 sec. Fall: G. Deierlein; spring: M. Sansalone.
For description see Engineering Common Courses.

CEE 120 Readings on the Environment
Fall. 1–2 credits.
C. A. Shoemaker.
A reading course from an introductory environmental text. Topics in the 1-credit course include structure and dynamics of ecosystems, water habitats and communities, water resources, toxic-waste pollution of surface and groundwater, international water-pollution problems, energy resources, nuclear-waste disposal, hydroelectric power, environmental carcinogens. Additional topics in the 2-credit version of the course. Not available to students receiving credit for ENGRI 113 after 1989.

CEE 241 Engineering Computation (also ENGRD 241)
Fall, spring. 3 credits. Prerequisites: COM S 100 and Mathematics 293. Corequisite: Mathematics 294.
2 lecs, 1 rec, 2 evening exams. P. L.-F. Liu, J. F. Abel.
For description see Engineering Common Courses.

CEE 304 Uncertainty Analysis in Engineering
Fall. 4 credits. Prerequisite: first-year calculus.
M. Grigoriu.
An introduction to probability theory, statistical techniques, and uncertainty analysis, with examples drawn from civil, environmental, agricultural, and related engineering disciplines. The course covers data presentation, probability theory, commonly used probability distributions, parameter estimation, goodness-of-fit tests, confidence intervals, hypothesis testing, simple linear regression, and nonparametric statistics. Examples include structural reliability, models of vehicle arrivals, analysis of return-period calculations, and distributions describing wind speeds, floods, pollutant concentrations, and soil and material properties.

CEE 309 Special Topics in Civil and Environmental Engineering
Fall, spring. 1–6 credits.
Staff.
Supervised study by individuals or groups of upper-division students on one or more specialized topics not covered in regular courses.

CEE 501 Civil and Environmental Engineering Design Project I
Fall. 3 credits. Required for students in the M.Eng.(Civil) program.
School faculty and visiting engineers.

Design of major civil engineering project. Planning and preliminary design in fall term; final design in January intersession (CEE 502).

CEE 502 Civil and Environmental Engineering Design Project II
Spring (work done during January intersession). 3 credits. Required for students in the M.Eng.(Civil) program. Prerequisite: CEE 501.
School faculty and visiting engineers.
A continuation of CEE 501.

CEE 503 Professional Practice in Engineering
Spring. 3 credits. Required for and limited to students in the M.Eng.(Civil) program.
W. R. Lynn.
Financial, legal, regulatory, ethical, and business aspects of engineering practice are examined in detail. Students are expected to develop their understanding of the interrelations among the physical, social, economic, and ethical constraints on engineering design.

CEE 601 Water Resources and Environmental Engineering Seminar
Fall. 1 credit.
Staff.
Presentation of topics of current interest.

Remote Sensing

[CEE 411 Remote Sensing: Environmental Applications (also SCAS 461)
Spring. 3 credits. Prerequisite: permission of instructor. Not offered 1992–93.
2 lecs, 1 lab.
A survey of how remote sensing is applied in various environmental disciplines. Laboratory emphasis is on using aircraft and satellite imagery for inventorying and monitoring surface features in engineering, planning, agriculture, and natural resource assessments.]

CEE 610 Remote Sensing Fundamentals (also Agronomy 660)
Fall. 3 credits. Prerequisite: permission of instructor.
2 lecs, 1 lab. W. D. Philpot.
An introduction to equipment and methods used in obtaining information about earth resources and the environment from aircraft or satellite. Coverage includes sensors; sensor and ground-data aquisition; data analysis and interpretation; and project design.

[CEE 612 Physical Environment Evaluation
Fall. 3 credits. Prerequisite: permission of instructor. Not offered 1992–93.
2 lecs, 1 lab. Staff.
Physical environmental factors affecting engineering planning decisions: climate, soil and rock conditions, water sources. Evaluation methods: interpretation of meteorological, topographic, geologic, and soil maps, aerial photographs, and subsurface exploration records.]

[CEE 613 Image Analysis I: Landforms
Fall. 3 credits. Prerequisite: permission of instructor. Not offered 1992–93.
2 lecs, 1 lab. Staff.
Analysis and interpretation of aerial photographs for a broad spectrum of soil, rock, and drainage conditions. Specific fields of application are emphasized.]

CEE 615 Digital Image Processing
Spring. 3 credits. Prerequisites: facility with algebra and trigonometry (Mathematics 109) and statistics (CEE 304 or Agricultural Economics 310), or permission of instructor.
2 lecs, 1 lab. W. D. Philpot.
An introduction to digital image-processing concepts and techniques, with emphasis on techniques used in remote-sensing applications. Topics include image acquisition, enhancement procedures, spatial and spectral feature extraction, and classification. Assignments will require the use of image-processing software and graphics.

[CEE 616 Digital Image Analysis
Spring. 3 credits. Prerequisites: calculus (Mathematics 192), statistics (CEE 304 or Agricultural Economics 310), and computer programming (FORTRAN or C), or permission of instructor. Not offered 1992–93.
2 lecs, 1 lab. W. D. Philpot.
Pattern recognition, feature extraction, and classification of digital images as used in remote-sensing applications. Both spectral and spatial patterns will be considered. Assignments will require the development of computer programs and will make use of existing image-processing software and graphics.]

CEE 617 Project—Remote Sensing
On demand. 1–6 credits.
Staff.
Students may elect to undertake a project in remote sensing. The work is supervised by a professor in this subject area.

CEE 618 Special Topics—Remote Sensing
On demand. 1–6 credits.
Staff.
Supervised study in small groups on one or more special topics not covered in the regular courses. Special topics may be of a theoretical or applied nature.

[CEE 619 Seminar in Remote Sensing (also SCAS 662)
Spring. 1 credit. S-U grades only. Not offered 1992–93.
Staff.
Lectures on current developments in assessing earth resources or the environment. Each week a different topic on remote sensing or geographic information systems is presented by specialists from government, industry, Cornell, or other research or academic institutions.]

CEE 710 Research—Remote Sensing
On demand. 1–6 credits.
Staff.
For students who want to study one particular area in depth. The work may take the form of laboratory investigation, field study, theoretical analysis, or development of design procedures.

CEE 810 Thesis—Remote Sensing
Fall, spring. 1–12 credits. Students must register for credit with the professor at the start of each term.
A thesis research topic is selected by the student with the advice of the faculty member in charge and is pursued either independently or in conjunction with others working on the same topic.

Environmental and Public Systems

See also CEE 120.

CEE 321 Microeconomic Analysis (also ENGRG 321 and Economics 313, section 5)
Fall. 4 credits. Prerequisite: one semester of calculus. A social science elective for engineering students.
R. E. Schuler.
For description see Engineering Common Courses.

CEE 322 Economic Analysis of Government (also ENGRG 322 and Economics 308)
Spring. 4 credits. Prerequisites: one semester of calculus, plus CEE 321 or Economics 313. A social science elective for engineering students.
R. E. Schuler.
For description see Engineering Common Courses.

CEE 323 Engineering Economics and Management (also ENGRG 323)
Spring. 3 credits. Primarily for juniors and seniors.
D. P. Loucks.
For description see Engineering Common Courses.

CEE 325 System Perspectives on Solid Waste Management
Fall. 3 credits. Open to juniors and seniors from all colleges who have had freshman chemistry or physics, and a calculus course.
R. E. Schuler.
An introduction to alternative technological solutions to society's solid waste problems with the interdisciplinary perspective of how those proposals interact with a broad range of public, environmental, and economic concerns. Using engineering, economic, legal, and political professionals, an integrated systems approach to problem solving will be emphasized and will culminate in a semester project in solid waste management planning that requires written and oral presentations by small groups. Field trips to operating facilities.

CEE 423 Environmental Quality Systems Analysis
Spring. 3 credits. Prerequisites: Math 294 and optimization (CEE 323 or ABEN 475, OR&IE 320/520). Intended for undergraduates. Lectures concurrent with CEE 623.
3 lecs. C. A. Shoemaker.
Applications of optimization and simulation methods to the development of plans and the design and operation of facilities for managing environmental quality. See description for CEE 623.

CEE 528 Interactive Modeling with Microcomputer Graphics
Spring. 3 credits. Prerequisite: Engr 241 or Engr 222, and permission of instructor.
D. P. Loucks.
Principles of interactive modeling and its application to the design and management of civil, environmental, and water-resources engineering systems. Topics will include tablet and video digitizing, image processing (including editing and overlaying pictures and maps), contouring, opaque and transparent coloring, generating 2-D and 3-D colored graphs, and developing pre- and postprocessors to permit the interactive use of various models for synthesizing designs and operating policies and for predicting system performance. Microcomputers with high-quality color-graphics capabilities will be available together with numerous interactive graphics subroutines for use in C or FORTRAN programs.

CEE 529 Water and Environmental Resources Problems and Policies
Fall. 3 credits. Intended primarily for graduate engineering and non-engineering

students but open to qualified upperclass students. Prerequisite: permission of instructor.

Lec-disc. D. Allee, L. B. Dworsky.
Evaluation, appraisal, and prospects for problems involving water and environmental resources. Organization and public policies in the federal system.

CEE 620 Water-Resources Systems I
Fall. 3 credits. Prerequisite: CEE 323 or equivalent.

D. P. Loucks.
Development and application of techniques for deterministic and stochastic optimization and simulation in water-resources planning. River-basin modeling, including reservoir design and operation, irrigation planning and operation, hydropower-capacity development, flow augmentation, flood control and protection, and water-quality models.

CEE 621 Water-Resources Systems II
Spring. 3 credits. Prerequisites: CEE 304 and 620 or permission of instructor.

J. R. Stedinger, D. P. Loucks.
Advanced topics in the development and use of optimization and simulation models for water-resources planning. Stochastic hydrologic modeling and stochastic river-basin and reservoir models. Incorporates material in CEE 622.

CEE 622 Stochastic Hydrologic Modeling
On demand. 2–3 credits. Prerequisite: OR&IE 370 or CEE 304.

J. R. Stedinger.
Develops statistical techniques used to analyze and model stochastic processes. Examination of Box-Jenkins, fractional-Brownian noise, and other single- and multiple-site stream-flow models; review of flood-frequency estimation issues; analysis of simulation output; parameter estimation and Bayesian inference.

CEE 623 Environmental Quality Systems Analysis
Spring. 3 credits. Prerequisites: Math 294 and optimization (CEE 323, Ag En 475, or OR&IE 320/520).

C. A. Shoemaker.
Applications of optimization and simulation methods to the design and operation of facilities for managing the quality of surface- and groundwater. Applications include location of wastewater and hazardous-waste facilities, restoration of dissolved oxygen levels in rivers, and reclamation of contaminated aquifers. Optimization applications use separable convex (linear) programming, and integer, dynamic, and nonlinear programming.

[CEE 626 Modeling Managed Ecosystems
Fall, on demand. 3 credits. Prerequisites: Mathematics 294, statistics, and population ecology. Not offered 1992–93.

C. A. Shoemaker.
The use of optimization and statistical estimation procedures to develop strategies for managing populations and ecosystems. Primary focus will be on pest management, poikilotherm populations, and mitigation of potential pollution from pesticides.]

CEE 628 Environmental and Water Resources Systems Analysis Seminar
Spring. 1 credit.

Staff.
Lectures on various topics related to environmental or water resources systems planning and analysis.

CEE 722 Environmental and Water Resources Systems Analysis Research
On demand. Variable credit. Prerequisite: permission of instructor. Preparation must be suitable to the investigation to be undertaken.

Staff.
Investigations of particular environmental or water resources systems problems.

CEE 729 Special Topics in Environmental or Water Resources Systems Analysis
On demand. Variable credit.

Staff.
Supervised study, by individuals or small groups, of one or more specialized topics not covered in regular courses.

CEE 820 Thesis—Environmental and Water Resource Systems
Fall, spring. 1–12 credits. Students must register for credit with the professor at the start of each term.
A thesis research topic is selected by the student with the advice of the faculty member in charge and is pursued either independently or in conjunction with others working on the same topic.

Fluid Mechanics and Hydrology

CEE 331 Fluid Mechanics
Fall. 4 credits. Prerequisite: Engr 203 (may be taken concurrently).

3 lecs, 1 rec, evening exams.
W. H. Brutsaert.
Hydrostatics, the basic equations of fluid flow, potential flow and dynamic pressure forces, viscous flow and shear forces, steady pipe flow, turbulence, dimensional analysis, open-channel flow. Elements of design in water supply systems, canals, and other hydraulic schemes.

CEE 332 Hydraulic Engineering
Spring. 4 credits. Prerequisite: CEE 331.

2 lecs, 1 lab, field trip. Staff.
Application of fluid-mechanical principles to problems of engineering practice and design: hydraulic machinery, water-distribution systems, open-channel design, river engineering, groundwater flow, and pollutant dispersal. Lectures supplemented by laboratory work and a design project.

CEE 431 Geohydrology (also ABEN 471 and GEOL 445)
Fall. 3 credits. Prerequisite: permission of instructor.

W. H. Brutsaert with J.-Y. Parlange and T. S. Steenhuis (in ABEN), and A. L. Bloom and L. Cathles (in GEOL).
An intermediate course in aquifer geology, groundwater flow, and related design factors. Includes description and properties of natural aquifers, groundwater hydraulics, soil water, and solute transport.

CEE 432 Hydrology
Fall. 3 credits. Prerequisite: CCE 331. Intended for undergraduates. Lectures concurrent with CEE 632.

3 lecs. W. H. Brutsaert.
Introduction to hydrology as a description of the water cycle and the role of water in the natural environment, and other issues for environmental engineers. See description for CEE 632.

CEE 433 Pollutant Transport and Transformation in the Environment
Fall. 3 credits. Prerequisite: CEE 331. Intended for undergraduates. Lectures concurrent with CEE 655.

3 lecs. J. J. Bisogni, G. H. Jirka.
Introduction to the physical transport and chemical and biochemical transformation processes that govern the fate and distribution of pollutants in the environment. See description for CEE 655.

CEE 630 Advanced Fluid Mechanics
Fall. 3 credits. Prerequisite: CEE 331. Offered alternate years. Offered 1992–93.

3 lecs. J. A. Liggett.
Introduction to tensor analysis; conservation of mass, momentum, and energy. Rigorous treatment includes study of exact solutions of the Navier-Stokes equations. Asymptotic approximations at low and high Reynolds numbers. Similitude and modeling. Laminar diffusion of momentum, mass, and heat.

CEE 631 Flow and Contaminant Transport Modeling in Groundwater
Spring. 3 credits. Prerequisites: Mathematics 294 or equivalent, Engr 241 or experience in numerical methods and programming, and elementary fluid mechanics.

J. A. Liggett.
Potential flows and their calculation. Numerical methods include finite difference, finite elements, and boundary elements. Fundamental equations of saturated and unsaturated flow in porous media. Flow in fractured media. Numerical modeling of transport in porous media. Diffusion and advective diffusion in one, two, and three dimensions. Anisotropy. Additional terms for reactive substances. The course will include the use of computer programs.

CEE 632 Hydrology
Spring. 3 credits. Prerequisite: CEE 331.

W. H. Brutsaert.
Physical and statistical prediction methods for design related to hydrologic processes. Hydrometeorology and evaporation. Infiltration and base flow. Surface runoff and channel routing. Linear and nonlinear hydrologic systems. Storage routing and unit hydrograph methods.

[CEE 633 Flow in Porous Media and Groundwater
Spring. 3 credits. Prerequisite: CEE 331. Not offered 1992–93.

W. H. Brutsaert.
Fluid mechanics and equations of single-phase and multiphase flow; methods of solution. Applications involve aquifer hydraulics, pumping wells; drought flows; infiltration, groundwater recharge; land subsidence; seawater intrusion, miscible displacement; transient seepage in unsaturated materials.]

CEE 634 Boundary Layer Meteorology
Spring. 3 credits. Prerequisite: CEE 331 or permission of instructor.

3 lecs. W. H. Brutsaert.
Physical processes in the lower atmospheric environment: turbulent transport in the atmospheric boundary layer, surface-air interaction, disturbed boundary layers, radiation. Applications include sensible and latent heat transfer from lakes, plant canopy flow and evapotranspiration, turbulent diffusion from chimneys and cooling towers, and related design issues.

[CEE 635 Coastal Engineering I
Spring. 3 credits. Prerequisite: CEE 331. Not offered 1992–93.
3 lecs. P. L.-F. Liu.
Linear wave theory, wave generation by wind, analysis of fluid forces on floating and fixed coastal structures and modification of waves and currents by these structures, coastal processes, and coastal sediment motion.]

CEE 636 Environmental Fluid Mechanics
Spring. 3 credits. Prerequisite: CEE 655. Offered alternate years.
G. H. Jirka.
Mass- and heat-transport processes in the environment and their interaction with pollutant discharges. Mechanics of discretely and continuously stratified fluids, internal waves, density currents, selective withdrawal, and baroclinic motions. Flow stability, mixing, and turbulence. Turbulent diffusion and shear flow dispersion, including effects of buoyancy. Convective instabilities and mixed-layer dynamics. Concentrated sources of momentum and buoyancy: jets and plumes and their behavior in the environment. Applications to mixing processes in rivers, lakes, the ocean, and the atmosphere.

CEE 638 Hydraulics Seminar
Spring. 1 credit. Open to undergraduates and graduates and required of graduate students majoring in hydraulics or hydraulic engineering.
Staff.
Topics of current interest in fluid mechanics, hydraulic engineering, and hydrology.

CEE 639 Special Topics in Hydraulics
On demand. Variable credit.
Staff.
Special topics in fluid mechanics, hydraulic engineering, or hydrology.

CEE 730 Coastal Engineering II
Spring. 3 credits. Prerequisite: CEE 635.
3 lecs. P. L.-F. Liu.
Review of linear and nonlinear theories for ocean waves, applicability of different wave theories to engineering problems, wave-energy transmission, tsunamis, behavior of submerged and floating bodies, harbor agitations, ship waves.

[CEE 732 Computational Hydraulics
Fall. 3 credits. Prerequisite: elementary fluid mechanics or permission of instructor. Offered alternate years. Not offered 1992–93.
J. A. Liggett.
Numerical methods for solving hydraulics and fluid-mechanics problems. Solutions for elliptic, parabolic, and hyperbolic equations. Finite-difference, finite-element, and boundary-integral methods.]

CEE 734 Experimental Methods in Hydraulics
On demand. 2 credits. Prerequisite: CEE 331.
G. H. Jirka.
Methods used in planning and conducting laboratory and field experiments in hydraulics and fluid mechanics. Dynamic similarity, modeling laws, and applications. General operating principles and performance characteristics of measurement instruments. Specific devices for measurement of fluid properties, pressure, and flow. Data acquisition, processing, and signal analysis. Laboratory demonstrations.

CEE 735 Research in Hydraulics
On demand. Variable credit.
Staff.
The student may select an area of investigation in fluid mechanics, hydraulic engineering, or hydrology. The work may be either experimental or theoretical in nature. Results should be submitted to the instructor in charge in the form of a research report.

CEE 830 Thesis—Fluid Mechanics and Hydrology
Fall, spring. 1–12 credits. Students must register for credit with the professor at the start of each term.
A thesis resarch topic is selected by the student with the advice of the faculty member in charge and is pursued either independently or in conjunction with others working on the same topic.

Geotechnical Engineering

CEE 341 Introduction to Geotechnical Engineering
Spring. 4 credits.
3 lecs, 1 lab-tutorial. Staff.
Soil as an engineering material. Chemical and physical nature of soil. Engineering properties of soil. Stresses and stress analysis of soil. Basic theory and design for water flow in soil, one-dimensional consolidation of clay and silts, and shear-strength problems. Introduction to slope stability, earth pressure, geosynthetics, and landfill and waste-containment issues. Introduction to laboratory testing. Synthesis of soil analysis and laboratory-test results for the design of engineering structures.

CEE 640 Foundation Engineering
Fall. 3 credits. Prerequisite: CEE 341.
3 lecs, optional tutorial. Staff.
Soil exploration, sampling, and in-situ testing techniques. Bearing capacity, stress distribution, and settlement. Design of shallow and deep foundations. Compaction and site preparation. Seepage and dewatering of foundation excavations.

CEE 641 Retaining Structures and Slopes
Spring. 3 credits. Prerequisite: CEE 341.
3 lecs, optional tutorial. Staff.
Earth pressure theories. Design of rigid, flexible, braced, tied-back, slurry, and reinforced soil structures. Stability of excavation, cut, and natural slopes. Design problems stressing application of course material under field conditions of engineering practice.

CEE 642 Highway Engineering (also ABEN 491)
Spring. 3 credits. Prerequisites: junior standing in engineering, fluid mechanics, and soil mechanics (may be taken concurrently).
2 lecs, 1 lab. L. H. Irwin.
For description see ABEN 491.

CEE 643 Pavement Engineering (also ABEN 692)
Fall. 4 credits. Limited to engineering seniors and graduate students. Prerequisite: CEE 341. Offered alternate years. Offered 1992.
3 lecs, 1 lab. L. H. Irwin.
For description see ABEN 692.

CEE 648 Seminar in Geotechnical Engineering
Fall, spring. 1 credit.
Staff.
Presentation and discussion of topics in current research and practice in geotechnical engineering.

CEE 649 Special Topics in Geotechnical Engineering
On demand. 1–6 credits.
Staff.
Supervised study of special topics not covered in the formal courses.

CEE 740 Engineering Behavior of Soils
Spring. 4 credits. Prerequisite: CEE 341.
3 lecs, 1 lab. Staff.
Detailed study of the physiochemical nature of soil. Stress states due to geostatic loading and stress-history effects. In-depth evaluation of stress-strain-strength, compressibility, and hydraulic conductivity of natural soils. Field-testing methods for determining properties based on laboratory testing. Weekly laboratory sessions include in-situ field testing, simple index tests, and complete laboratory characterization of important soil properties.

CEE 741 Rock Engineering
Fall. 3 credits. Prerequisite: CEE 341 or permission of instructor. Recommended: introductory geology.
2 lecs, 1 lab. Staff.
Geological and engineering classifications of intact rock, discontinuities, and rock masses. Laboratory and field evaluation of properties. Stress states and stress analysis. Design of foundations on, and openings in, rock masses. Analysis of the stability of rock slopes.

CEE 744 Advanced Foundation Engineering
Spring. 2 credits. Prerequisite: CEE 640.
2 lecs. Staff.
A continuation of CEE 640, with detailed emphasis on special topics in soil-structure interaction. Typical topics include lateral and pullout loading of deep foundations, pile group behavior, foundations for offshore structures, pile-driving dynamics, foundations for special structures.

[CEE 745 Soil Dynamics
Spring. 4 credits. Prerequisite: permission of instructor. Not offered 1992–93.
3 lecs, 1 lab. Staff.
Study of soil behavior under dynamic loading conditions. Foundation design for vibratory loadings. Introductory earthquake engineering including field and laboratory techniques for determining dynamic soil properties and liquefaction potential. Design of embankments and retaining structures under dynamic loading conditions. Laboratory experiments and demonstrations using resonant column and a range of cyclic testing equipment.]

[CEE 746 Embankment Dam Engineering
Spring. 2 credits. Prerequisites: CEE 641 and 741, or permission of instructor. Not offered 1992–93.
2 lecs. Staff.
Principles of analysis and design for earth and rockfill dams. Materials, construction methods, internal and external stability, seepage and drainage, performance monitoring, abutment and foundation evaluation. Introduction to tailings dams.]

[CEE 747 Case Studies in Geotechnical Engineering
Spring. 3 credits. Prerequisites: CEE 641 and 741. Not offered 1992–93.
Staff.
Study of case histories in geotechnical engineering. Critical evaluation of successful

and unsuccessful projects. Oral presentations and engineering report evaluation of each case.]

[CEE 748 Tunnel Engineering
Spring. 2 credits. Prerequisites: CEE 641 and 741. Not offered 1992–93.
2 lecs. Staff.
Principles of analysis and design for earth and rock tunnels. Materials, construction methods, stability and support systems, deformations, and performance monitoring.]

CEE 749 Research in Geotechnical Engineering
On demand. 1–6 credits.
Staff.
For the student who wants to pursue a particular geotechnical topic in considerable depth.

CEE 840 Thesis—Geotechnical Engineering
Fall, spring. 1–12 credits. Students must register for credit with the professor at the start of each term.
A thesis research topic is selected by the student with the advice of the faculty member in charge and is pursued either independently or in conjunction with others working on the same topic.

Environmental Engineering

CEE 351 Environmental Quality Engineering
Spring. 3 credits.
3 lecs. L. W. Lion.
Introduction to engineering aspects of environmental quality control. Quality parameters, criteria, and standards for water and wastewater. Emphasis on water-quality control concepts, theory, and methods. Elementary analysis pertaining to the modeling of pollutant reactions in natural systems, and introduction to design of unit processes for water and wastewater treatment.

CEE 352 Water Supply Engineering
Fall. 3 credits. Prerequisite: CEE 351 or permission of instructor.
3 lecs. R. I. Dick.
Analysis of contemporary threats to human health from public water supply systems. Criteria and standards for potable-water quality. Water-quality control theory. Design of facilities for obtaining, treating, storing, and distributing water.

CEE 651 Microbiology for Environmental Engineering
Fall. 2 credits. Prerequisite: one semester of college chemistry.
2 lecs. J. M. Gossett.
A self-paced autotutorial introduction to fundamental aspects of microbiology, organic chemistry, and biochemistry pertinent to environmental engineering. Course work consists of assigned readings, study questions, and brief exams.

CEE 653 Water Chemistry for Environmental Engineering
Fall. 3 credits. Prerequisite: one semester of college chemistry or permission of instructor.
3 lecs, 3 recs. L. W. Lion.
Principles of chemistry applicable to the understanding, design, and control of water and wastewater treatment processes and to reactions in receiving waters. Topics include chemical thermodynamics, reaction kinetics, acid-base equilibria, mineral precipitation/dissolution, and electrochemistry. The focus of the course is on the mathematical description of chemical reactions relevant to engineered processes and natural systems, and the numerical or graphical solution of these problems.

CEE 654 Aquatic Chemistry
Spring. 3 credits. Prerequisite: CEE 653 or Chemistry 287–288.
3 lecs. J. J. Bisogni.
Concepts of chemical equilibria applied to natural aquatic systems. Topics include acid-base reactions, buffer systems, mineral precipitation, coordination chemistry, redox reactions, adsorption phenomena and chemical-equilibria computations. In depth coverage of topics covered in CEE 653.

CEE 655 Pollutant Transport and Transformation in the Environment
Fall. 3 credits. Prerequisite: CEE 331.
J. J. Bisogni, G. H. Jirka.
An introduction to the physical transport and chemical and biochemical transformation processes that govern the fate and distribution of pollutants in the environment. Advective and diffusive mass transport, turbulent diffusion and shear-flow dispersion in water or atmosphere, dispersion in groundwater flow, homogeneous and heterogeneous chemical reactions and their effects on transport phenomena, air-water-soil interface transfer processes. Emphasis on physical mechanisms, with some applications to surface water, groundwater, and atmospheric transport and quality models.

CEE 658 Sludge Treatment, Utilization, and Disposal
Spring. 3 credits. Prerequisite: CEE 351 or permission of instructor.
3 lecs. R. I. Dick.
Analysis of the quantity and quality of residues produced from municipal and industrial water-supply and pollution-control facilities and other residue-producing processes as functions of process design and operational variables; alternatives for reclaiming or disposing of hazardous and nonhazardous residues with assessment of potential environmental impacts; fundamental factors influencing performance of treatment processes for removing water from sludges and for altering sludge properties prior to reuse or ultimate disposal; and considerations in selection and integration of sludge-management processes to approach optimal design.

CEE 659 Environmental Quality Engineering Seminar
Spring. 1 credit. Intended for all graduate students in environmental engineering.
R. I. Dick.
Presentation and discussion of current research and design projects in environmental engineering.

CEE 750 Research in Environmental Engineering
On demand. 1–6 credits.
Staff.
For students who want to study one particular area in depth. The work may take the form of laboratory investigation, field study, theoretical analysis, or development of design and analysis procedures.

CEE 755 Environmental Engineering Processes I
Fall. 3 credits. Prerequisite: Previous or concurrent enrollment in CEE 653 or permission of instructor.
3 lecs. J. M. Gossett.
Theoretical and engineering aspects of chemical and physical phenomena and processes applicable to the removal of impurities from water, wastewater, and industrial wastes and to their transformation in receiving waters. Analysis and design of treatment processes and systems.

CEE 756 Environmental Engineering Processes II
Spring. 3 credits. Prerequisites: CEE 651 and 755, or permission of instructor.
3 lecs. J. M. Gossett.
Theoretical and engineering aspects of biological phenomena and processes applicable to the removal of impurities from water, wastewater, and industrial wastes and to their transformation in receiving waters. Biokinetic analysis and design of biological treatment process.

CEE 757 Environmental Engineering Processes Laboratory I
Fall. 2 credits. Prerequisite: concurrent enrollment in CEE 653 and CEE 755.
1 lab. J. M. Gossett, L. W. Lion.
Laboratory studies of aquatic chemistry and physical/chemical processes of environmental engineering. Topics include gravimetric analyses; acids/bases; alkalinity; gas chromatography; UV-visible and atomic absorption spectrophotometry; adsorption; filtration; ion exchange; gas transfer; sedimentation; characterization of reactor mixing regimes; coagulation.

CEE 758 Environmental Engineering Processes Laboratory II
Spring. 2 credits. Prerequisite: CEE 651 and concurrent enrollment in CEE 756.
1 lab. J. M. Gossett.
Laboratory studies of microbiological phenomena and environmental engineering processes. Topics include microscopy; biochemical and chemical oxygen demand; biological treatability studies; enumeration of bacteria.

CEE 759 Special Topics in Environmental Engineering
On demand. Variable credit.
Hours to be arranged. Staff.
Supervised study in special topics not covered in formal courses.

CEE 850 Thesis—Environmental Engineering
Fall, spring. 1–12 credits. Students must register for credit with the professor at the start of each term.
A thesis research topic is selected by the student with the advice of the faculty member in charge and is pursued either independently or in conjunction with others working on the same topic.

Transportation

CEE 361 Introduction to Transportation Engineering
Spring. 3 credits.
A. H. Meyburg.
Introduction to technological, economic, and social aspects of transportation. Emphasis on design and functioning of transportation systems and their components. Supply-demand interactions; system planning, design, and management;traffic flow and control intersection and network analysis. Institutional and energy issues; environmental impact.

[CEE 660 Transportation Planning and Policy
Fall. 3 credits. Prerequisite: permission of instructor. Not offered 1992–93.
A. H. Meyburg.
Public-sector planning and decision making for transportation. Problems of urban transportation and their implications. A systems-analysis approach to formulation of transportation policy at the local, regional, state, and federal levels. Consideration of urban-transportation planning models.]

CEE 664 Transportation Systems Design
Spring. 3 credits. Prerequisite: CEE 361.
M. A. Turnquist.
Advanced techniques for physical and operational design of transportation systems, including analytical modeling techniques underlying design criteria. Evaluation of alternative designs. Management and operating policies, including investment strategies. Facility location decisions, networks, and passenger and freight terminals.

CEE 762 Transportation Research
On demand. Variable credit.
Staff.
In-depth investigation of a particular transportation planning or engineering problem mutually agreed upon between the student and one or more faculty members.

CEE 764 Special Topics in Transportation
On demand. Variable credit.
Staff.
Advanced subject matter not covered in depth in other regular courses.

CEE 860 Thesis—Transportation Engineering
Fall, spring. 1–12 credits. Students must register for credit with the professor at the start of each term.
A thesis research topic is selected by the student with the advice of the faculty member in charge and is pursued either independently or in conjunction with others working on the same topic.

Structural Engineering

See also CEE 116.

CEE 371 Structural Behavior
Fall. 4 credits. Prerequisite: Engr 202.
3 lecs, one 2-hour lab, evening exams.
J. F. Abel.
Fundamental concepts of structural engineering: behavior, analysis, and design. Loads, structural materials, structural form, statically determinate analysis, approximate analysis of indeterminate systems. Use of interactive graphical analysis programs. Fundamentals of behavior of steel and concrete members. Structural limit states: plastic collapse, buckling, resonance. Introduction to structural design by allowable-stress and limit-state approaches.

CEE 372 Structural Analysis
Spring. 4 credits. Prerequisite: CEE 371.
3 lecs, one 2-hour lab, evening exams.
Staff.
Fundamentals of statically indeterminate structures. Moment-area and virtual-work methods of displacement computation. Matrix flexibility and stiffness methods. Moment distribution analysis. Influence lines. Computer applications to practical structures. Role and limitations of analysis in design. The art of structural modeling for analysis and design.

CEE 373 Design of Concrete Structures
Fall. 4 credits. Prerequisites: CEE 372 or permission of instructor. Prerequisites or corequisites: CEE 376 and Engr 261.
2 lecs, one 2-hour lab, design project.
P. Gergely.
Behavior and design of reinforced concrete, prestressed concrete, and composite structures.

CEE 374 Design of Steel Structures
Spring. 4 credits. Prerequisite: CEE 372 or permission of instructor. Prerequisites or corequisites: CEE 376 and Engr 261.
3 lecs, one 2-hour sec, evening exams, design project. G. G. Deierlein, T. Pekōz.
Behavior and design of steel members, connections, and structures. Discussion of structural systems for buildings and bridges.

CEE 376 Civil Engineering Materials
Fall. 3 credits.
2 lecs, 1 lab. Staff.
Engineering properties of concrete, steel, wood, and other structural materials. Design characteristics and significance of test results of materials used in engineering works. Developing QA/QC programs and writing specifications. Extensive laboratory testing and report writing.

CEE 671 Random Vibration
Fall. 3 credits. Prerequisites: M&AE 326, CEE 779, and OR&IE 260; or equivalent and permission of instructor. Offered alternate years.
M. D. Grigoriu.
Review of random-process theory, simulation, and first-passage time. Linear random vibration: second-moment response descriptors and applications from fatigue; seismic analysis; and response to wind, wave, and other non-Gaussian load processes. Nonlinear random vibration: equivalent linearization, perturbation techniques, Fokker-Planck and Kolmogorov equations, Itō calculus, and applications from chaotic vibration, fatigue, seismic analysis, and parametrically excited systems.

CEE 672 Fundamentals of Structural Mechanics
Fall. 3 credits. Prerequisite or corequisite: CEE 373.
M. D. Grigoriu.
Theory of elasticity, energy principles, plate flexure, failure theories for structural design, beams on elastic foundation, finite-difference method, plate theory, energy principles, introduction to finite-element method.

CEE 673 Advanced Structural Analysis
Fall. 3 credits. Prerequisites: CEE 372 and computer programming.
Evening exams, programming project.
A. Ingraffea.
Matrix analysis of structures, computer programming of displacement (stiffness) method, use of interactive graphical analysis programs, solution methods, errors and accuracy, special analysis procedures, virtual work in matrix analysis, and introduction to nonlinear analysis.

[CEE 674 Structural Model Analysis and Experimental Methods
Spring. Variable credit. Not offered 1992–93.
R. N. White.
Experimental behavior of structures. Dimensional analysis and similitude. Model materials, fabrication, loading, instrumentation techniques, and use of models in design. Experimental stress analysis. Laboratory exercises and project.]

CEE 675 Concrete Materials and Construction
Spring. 3 credits. Prerequisite: CEE 376 or equivalent.
2 lecs, 1 lab. Staff.
Materials science, structural engineering, and construction technology involved in the materials aspects of the use of concrete. Cement chemistry and physics, mix design, admixtures, engineering properties, testing of fresh and hardened concrete, and the effects of construction techniques on material behavior. Lab assignments.

[CEE 677 Stochastic Mechanics
Spring. 3 credits. Prerequisite: permission of instructor. Offered alternate years. Not offered 1992–93.
M. D. Grigoriu.
Review of concepts of probability theory, random processes, and random fields. Analytical and numerical methods for reliability analysis. Methods for solution of random eigenvalue problems, equilibrium of uncertain systems and systems with random imperfections, and propagation problems in stochastic systems. Applications include stochastic finite elements, probabilistic fracture mechanics, and dynamic Daniels sytems.]

CEE 680 Structural Engineering Seminar
Fall, spring. 1 credit. Limited to qualified seniors and graduate students.
Staff.
Presentation of topics of current interest in the field of structures.

CEE 770 Engineering Fracture Mechanics
Fall. 3 credits. Prerequisite: CEE 772 or permission of instructor. Offered alternate years.
2 lecs, 1 lab. A. R. Ingraffea.
Fundamentals of fracture-mechanics theory. Energy and stress-intensity approaches to fracture. Mixed-mode fracture. Fatigue-crack propagation. Finite- and boundary-element methods in fracture mechanics. Introduction to elastic-plastic fracture mechanics. Interactive computer graphics for fracture simulation. Laboratory techniques for fracture-toughness testing of metals, concrete, and rock.

CEE 772 Finite-Element Analysis
Spring. 3 credits. Prerequisites: CEE 672 and 673, or permission of instructor.
J. F. Abel.
Conceptual, theoretical, and practical bases for finite-element analysis in structural mechanics and other disciplines. Development and evaluation of formulations for one-, two-, and three-dimensional elements. Introduction to boundary-element analysis. Interactive computer graphics for finite- and boundary-element analysis.

CEE 773 Structural Reliability
Spring. 3 credits. Prerequisite: permission of instructor.
M. D. Grigoriu.
Review of probability theory, practical measures for structural reliability, second-moment reliability indices, probability models for strength and loads, probability-based design codes, reliability of structural systems, imperfection-sensitive structures, fatigue, stochastic finite-element techniques, elementary concepts of probabilistic fracture mechanics.

CEE 774 Prestressed Concrete Structures
Spring. 3 credits. Prerequisites: CEE 373 and 376 or equivalent. Recommended: CEE 775.
3 lecs. R. N. White.
Behavior, analysis, design of pretensioned and posttensioned prestressed concrete structures. Flexure, shear, bond, anchorage zone design, cracking, losses. Partial prestressing. Strength, serviceability, structural efficiency of beams, slabs, tension members, frameworks, parking garages, and bridges.

CEE 775 Advanced Reinforced Concrete
Fall. 3 credits. Prerequisites: CEE 373 and 376 or equivalent.
3 lecs. R. N. White.
General flexural analysis, deflection analysis, columns with uniaxial and biaxial bending, beam-supported slabs, flat-plate slabs, ground-supported slabs, yield-line theory, limit-state analysis, redistribution effects and ductility demands, deep beams, building systems, and seismic design.

CEE 776 Advanced Design of Metal Structures
Fall. 3 credits. Prerequisite: CEE 374 or equivalent.
T. Peköz.
Preliminary design of structural systems. Design of members and connections. Behavior and computer-aided design of building frames. Design of composite members.

CEE 777 Advanced Behavior of Metal Structures
Spring. 3 credits. Prerequisite: CEE 374 or equivalent.
T. Peköz.
Analysis of elastic and inelastic stability. Behavior and design of hot-rolled and cold-rolled steel and aluminum members, elements, and frames. Critical review of design specifications.

CEE 778 Shell Theory and Design
Fall. 2–3 credits. Offered alternate years.
P. Gergely.
Fundamentals of practical shell theory. Differential geometry of surfaces; membrane and bending theory of shells; analysis and design of cylindrical shells, polygonal domes, and paraboloids.

CEE 779 Structural Dynamics and Earthquake Engineering
Spring. 3 credits.
P. Gergely.
Modal analysis, numerical methods, and frequency-domain analysis. Introduction to earthquake-resistant design.

[CEE 780 Advanced Concrete Material Science
Fall. 3 credits. Prerequisites: CEE 376 or equivalent and CEE 675. Not offered 1992–93.
K. C. Hover.
Advanced study of the chemistry, physics, and microstructure of cement and concrete. Investigation of cement manufacture and chemistry, hydration reactions and effect of admixtures. Study of microstructure with scanning electron microscopy, and porosimetry. Engineering properties and behavior include failure mechanisms and elastic and viscoelastic behavior. Durability. Student presentations.]

[CEE 782 Advanced Topics in Finite-Element Analysis
Fall. 3 credits. Prerequisite: CEE 772. Offered alternate years. Not offered 1992–93.
J. F. Abel, A. R. Ingraffea.
Lectures and colloquia on selected advanced topics and research in progress, including dynamics, nonlinear analysis, shells, fracture mechanics, fluid dynamics, and computer graphics.]

CEE 783 Civil and Environmental Engineering Materials Project
On demand. 1–3 credits.
Staff.
Individual projects or reading and study assignments involving engineering materials.

CEE 785 Research in Structural Engineering
On demand. Variable credit.
Hours to be arranged. Staff.
Pursuit of a branch of structural engineering beyond what is covered in regular courses. Theoretical or experimental investigation of suitable problems.

CEE 786 Special Topics in Structural Engineering
On demand. Variable credit.
Hours to be arranged. Staff.
Individually supervised study or independent design or research in specialized topics not covered in regular courses.

CEE 880 Thesis—Structural Engineering
Fall, spring. 1–12 credits. Students must register for credit with the professor at the start of each term.
A thesis research topic is selected by the student with the advice of the faculty member in charge and is pursued either independently or in conjunction with others working on the same topic.

Engineering Management

[CEE 590 Engineering Management Practice
Fall. 3 credits. Prerequisite: permission of instructor. Not offered 1992–93.
K. C. Hover.
An introduction to the work and skills of management. Planning, organizing, communicating, controlling, and correcting will be covered in combination of lectures, readings, outside assignments, in-class role-playing exercises, and talks by visiting speakers.]

CEE 591 Engineering Management Project
Fall. 3 credits. Prerequisite: permission of instructor.
K. C. Hover, M. A. Turnquist.
An intensive evaluation of the management aspects of a major engineering project or system. Most students will work on a large group project in the area of project management, but students may also work singly or in small groups on an engineering management topic of special interest to them.

CEE 592 Engineering Management Project
Spring. 3 credits. Prerequisite: permission of instructor.
K. C. Hover, M. A. Turnquist.
A continuation of CEE 591.

CEE 593 Engineering Management Methods I: Data, Information, and Modeling
Fall. 3 credits. Prerequisites: OR&IE 320 and OR&IE 270 or CEE 304 or equivalent, or co-registration in CEE 692.
M. A. Turnquist, C. A. Shoemaker.
Methods for managing data and transforming data into information. Modeling as a means to synthesize information into knowledge that can form the basis for decisions and actions. Application of statistical methods and optimization to managerial problems in project scheduling, quality control, forecasting, and resource allocation. Students lacking the prerequisites may register for this course if they are also registered for CEE 692, Section 1, which covers the necessary background material.

CEE 594 Engineering Management Methods II: Managing Uncertain Systems
Spring. 3 credits. Prerequisite: CEE 593 or permission of instructor.
M. A. Turnquist.
Modeling and managing systems in which uncertainty is a major determinant of system behavior. Systems which are subject to breakdown, deterioration and queuing. Optimization under uncertainty. Simulation as a tool for analyzing uncertain systems. Projects and case studies to illustrate application of the methods.

CEE 595 Construction Planning and Operations
Fall. 3 credits. Prerequisite: permission of instructor.
3 lecs. K. C. Hover.
A course on the fundamentals of construction planning: organization of the worksite, construction planning, scheduling, and cost estimating, bidding design of falsework and shoring systems, construction loadings, materials handling for construction, optimization of construction processes, applications of computer methods.

[CEE 596 Building Systems Integration
Spring. 3 credits. Prerequisite: permission of instructor. Not offered 1992–93.
3 lecs. Staff.
Emphasizes the engineering design and construction process as a total systems problem: overall structural planning and the sequence of assembly, impact of assembly details on construction procedures, review of designs for constructability, integration of engineering services, introduction to value engineering, construction documents, and contract administration.]

CEE 597 Risk Analysis and Management
Spring. 3 credits. Prerequisite: CEE 304 or OR&IE 270 or equivalent.
3 lecs. J. R. Stedinger, M. A. Turnquist.
The analysis and management of risks in technological systems, including energy production, waste disposal, engineering construction, and transportation. Probability models of failure, exposure, and consequences. Public-sector decision making and regulation of risks.

CEE 598 Decision Making in Engineering Systems
Spring. 3 credits. Prerequisite: permission of instructor.
3 lecs. Staff.
An examination of the decision-making behavior of managers and users of engineering systems. Such behavior will be addressed from various perspectives, including economic theories of choice, psychological theories of perception and choice, and consumer theories from marketing research.

CEE 692 Special Topics in Engineering Management
On demand. 1–6 credits.
Staff.
Supervised study in small groups on one or more special topics not covered in the regular courses.

CEE 694 Research in Engineering Management
On demand. 1–6 credits.
Staff.
The student may select an area of investigation in engineering management. Results should be submitted to the instructor in charge in the form of a research report.

COMPUTER SCIENCE

The Department of Computer Science is part of both the College of Arts and Sciences and the College of Engineering.

COM S 100 Introduction to Computer Programming (also Engr 100)
Fall, spring, summer. 4 credits. Students who plan to take COM S 101 or 102 and also 100 must take 101 or 102 first.
2 lecs, 1 rec (optional), 3 evening exams.
An introduction to elementary computer programming concepts. Emphasis is on techniques of problem analysis and the development of algorithms and programs. The subject of the course is programming, not a particular programming language. The principal programming language is Pascal. The course does not presume previous programming experience. An introduction to numerical computing is included, although no college-level mathematics is presumed. Programming assignments are tested and run on interactive, stand-alone microcomputers.

COM S 101 The Computer Age (also ENGRG 101)
Fall, summer. 3 credits. Credit is granted for both COM S 100 and 101 only if 101 is taken first.
An introduction to computer science and programming for students in nontechnical areas. The aims of the course are to acquaint the student with the major ideas in computer science and to develop an appreciation of algorithmic thinking. Topics may include the history of computation; microtechnology; the retrieval and transmission of information; scientific computing; computer graphics, art, and music; robotics, natural-language processing, and machine intelligence. Students become acquainted with the concept of an algorithm by writing several programs in Pascal or Scheme and testing them on microcomputers. The amount of programming is about half that taught in COM S 100.

COM S 107 An Introduction to SCHEME
Spring. 1 credit. Prerequisite: Introductory course in PASCAL, or equivalent programming experience.
3 lecs.
An accelerated introduction to SCHEME, a dialect of LISP. Recommended for students who intend to pursue the computer science major. Taught in the first four weeks of the semester.

COM S 172 An Introduction to Artificial Intelligence (also Engr 172)
Spring. 3 credits. Prerequisites: COM S 100 or COM S 101; and precalculus-level mathematics.
3 lecs, 2 evening exams.
For description see Engineering Common Courses.

COM S 211 Computers and Programming (also ENGRD 211)
Fall, spring, summer. 3 credits. Credit will not be granted for both COM S 211 and 212. Prerequisite: COM S 100 or equivalent programming experience.
2 lecs, 1 rec, 2 evening exams.
Intermediate programming in a high-level language and introduction to computer science. Topics include program development, proofs of program correctness, program structure, recursion, abstract data types, data structures, and analysis of algorithms. Pascal is the principal programming language.

COM S 212 Modes of Algorithmic Expression
Fall, spring. 4 credits. Credit will not be granted for both COM S 211 and 212. Prerequisite: COM S 100 or equivalent programming experience.
2 lecs, 2 recs, 2 evening exams.
A challenging introduction to programming languages and computer science that emphasizes alternative modes of algorithmic expression. Topics include recursive and higher-order procedures, performance analysis of algorithms, proofs of program correctness, probabilistic algorithms, symbolic hierarchical data, abstract data types, polymorphic functions, object-oriented programming, infinite data types, simulation, and the interpretation of programs. Programs are written in Scheme, a dialect of LISP.

COM S 212 emphasizes a varied collection of advanced programming concepts and techniques available in a modern functional programming language. In contrast, COM S 211 focuses on perfecting programming skills in a conventional imperative programming language. Corrective transfers between COM S 211 and 212 (in either direction) are encouraged during the first few weeks of instruction.

COM S 214 A Taste of C and UNIX
Fall, spring. 1–2 credits. Prerequisite: COM S 211 or equivalent programming experience.
3 lecs, 4 weeks (1 credit), 8 weeks (2 credits).
A brief introduction to the UNIX operating system and the C programming language. Recommended for students who intend to pursue the computer science major. Taught in the first four to eight weeks of the semester. The 2-credit version involves an implementation project.

COM S 222 Introduction to Scientific Computation (also ENGRD 222)
Spring. 3 credits. Prerequisites: COM S 100 and pre/corequisite of MATH 221 or MATH 293.
2 lecs, 1 rec, 2 evening exams.
An introduction to elementary numerical analysis and scientific computation. Students write Matlab/FORTRAN programs and use high-quality numerical software packages to solve representative problems. Emphasis is on efficient, reliable, and stable methods for the basic problems of computational mathematics. Special topics include supercomputing and parallel computation.

COM S 280 Discrete Structures
Fall, spring. 4 credits. Prerequisite: COM S 211 or 212 or permission of instructor.
3 lecs.
Covers mathematical aspects of programming and computing. Topics will be chosen from the following: mathematical induction; logical proof; propositional and predicate calculus; combinatorics and discrete mathematics covering manipulation of sums, recurrence relations, and generating-function techniques; basic number theory; sets, functions, and relations; partially ordered sets; graphs.

COM S 314 Introduction to Digital Systems and Computer Organization
Fall, spring, summer. 4 credits. Prerequisite: COM S 211 or equivalent.
2 lecs, 1 sec, 2 evening exams.
Introduction to computer organization. Topics include representation of information, machine-assembly languages, processor organization, interrupts and I/O, memory hierarchies, combinatorial and sequential circuits, data path and control unit design, RTL, and microprogramming.

COM S 381 Introduction to Theory of Computing
Fall. 4 credits. Prerequisite: COM S 280 or permission of instructor.
3 lecs.
An introduction to modern theory of computing: automata theory, formal languages, and effective computability.

COM S 400 The Science of Programming
Spring. 4 credits. Prerequisite: COM S 280 or equivalent. Not offered every year.
3 lecs. D. Gries.
The practical development of correct programs based on the conscious application of principles that are derived from a mathematical notion of program correctness. Besides dealing with conventional sequential programs, the course covers implementations of abstract data types and contains an introduction to problems with concurrency. Issues in programming-language design that arise from program correctness are discussed. Programs are written but not run on a computer.

COM S 410 Data Structures
Fall, spring, summer. 4 credits. Prerequisite: COM S 280 or permission of instructor.
2 lecs, 2 evening exams.
Lists, trees, graphs, arrays, and other forms of data structure and their implementation. Relationship between language and data structure, emphasizing abstract data types. Dynamic storage allocation and memory management. Detailed study of searching and sorting methods. Analysis to determine the more efficient algorithm in a given situation.

COM S 411 Programming Languages and Logics
Fall. 4 credits. Prerequisite: COM S 410 or permission of instructor. Not offered every year.
2 lecs.
The major concepts of programming languages, with emphasis on synthesis and interpretation. Language-based programming methodologies, including object-oriented, functional, and logic programming. Design and criticism of programming languages. Type theory and typed λ-calculus. Exercises in several unusual programming languages.

COM S 412 Introduction to Compilers and Translators
Spring. 3 credits. Prerequisites: COM S 314, 381, 410. Corequisite: COM S 413.
2 lecs, 1 lab.

Overview of the internal structure of modern compilers, with emphasis on implementation techniques. Topics covered include lexical scanning, simple parsing techniques, symbol-table manipulation, type-checking routines, code generation, and simple optimizations. The course entails a compiler implementation project.

COM S 413 Practicum in Compilers and Translators
Spring. 2 credits. Prerequisites: COM S 314, 381, 410. Corequisite: COM S 412.
1 lab.
A compiler implementation project related to COMS 412.

COM S 414 Systems Programming and Operating Systems
Fall. 3 credits. Prerequisite: COM S 314 or permission of instructor.
2 lecs, 2 evening exams.
An introduction to the logical design of systems programs, with emphasis on multiprogrammed operating systems. Topics include process synchronization, deadlock, memory management, input-output methods, information sharing, protection and security, and file systems. The impact of network and distributed computing environments on operating systems is also discussed.

COM S 415 Practicum in Operating Systems
Fall. 2 credits. Prerequisite: COM S 410. Corequisite: COM S 414.
1 lec.
The practical aspects of operating systems are studied through the design and implementation of an operating system kernel that supports multiprogramming, virtual memory, and various input-output devices. All the programming for the project is in a high-level language.

COM S 417 Computer Graphics and Visualization
Spring. 3 credits. Prerequisite: COM S 211 or 212. Not offered every year.
2 lecs, 1 lab.
An introduction to the principles of interactive computer graphics and scientific visualization. Topics include two- and three-dimensional graphics algorithms (perspective transformations, hidden-line and hidden-surface algorithms, parametric surfaces), lighting models, image synthesis, and application to scientific data analysis.

COM S 418 Practicum in Computer Graphics
Spring. 2 credits. Prerequisite: COM S 211 or 212. Recommended: COM S 314. Corequisite: COM S 417. Not offered every year.
1 lab.
Programming assignments dealing with interactive computer graphics and visualization of scientific data.

COM S 421 Numerical Analysis
Fall. 4 credits. Prerequisites: Mathematics 294 or equivalent, one additional mathematics course numbered 300 or above, and knowledge of programming.
3 lecs.
Modern algorithms for systems of linear equations, systems of nonlinear equations, numerical optimization, and numerical solution of differential equations. Some discussion of methods suitable for parallel computation.

COM S 422/522 Parallel Computing for Scientific Problems
Spring. 4 credits. Prerequisites: COM S 222 or COM S 421, knowledge of C and FORTRAN. Enrollment limited.
3 lecs.
Discusses parallel algorithms for important scientific problems, such as fluid flow, systems of particles, and large-scale optimization. This course will involve algorithm development on some of the world's fastest computers, including a Connection Machine and a hypercube. Students enrolled in COM S 522 are expected to engage in more substantial software-development assignments.

COM S 432 Introduction to Database Systems
Spring. 3 credits. Prerequisites: Either COM S 211or 212, and 410, or permission of instructor. Recommended: COM S 314.
2 lecs, 1 rec.
Introduction to modern database management systems. Concepts in data modeling and query processing. Storage structures and access methods. Design and analysis of relational databases. Concurrency control. Object-oriented databases.

COM S 433 Practicum in Database Systems
Spring. 2 credits. Corequisite: COM S 432.
1 lab.
Issues related to the design and implementation of database-management systems will be addressed. Students will implement a simplified relational database system, including a file-access method and query-processing algorithms.

COM S 444 Distributed Systems and Algorithms
Fall. 4 credits. Corequisite: COM S 414 or permission of instructor. Not offered every year.
The fundamentals of distributed systems and algorithms. Topics include the problems, methodologies and paradigms necessary for understanding and designing distributed applications, with an emphasis on fault-tolerant computing. Theoretical concepts will be complemented with practical examples of their application in current distributed systems.

COM S 462 Robotics and Machine Vision
Spring. 3 credits. Prerequisite: Permission of instructor, COM S 410, and COM S 381. Corequisite: COM S 463.
3 lecs.
Introduction to the science of robotics and machine vision using a combination of programming techniques, applied mathematics, algorithms, and lab experiments. Topics include task-level robot planning and programming, hand-eye systems, feature detection and object recognition, motion planning, shape reconstruction, compliant motion and assembly, model-based planning and recognition, uncertainty and error, active sensing, and manipulation.

COM S 463 Robotics and Machine Vision Lab
Spring. 2 credits. Prerequisite: Permission of instructor, COM S 410, and COM S 381. Corequisite: COM S 462.
1 lab.
Use physical robots (vision systems, hand-eye systems, and mobile robots) in the Computer Science Robotics and Vision Teaching Laboratory. Students should be comfortable both with mathematical concepts and programming, know LISP or Scheme, have a mastery of calculus and linear algebra, a strong background in algorithms, and an ability to work independently.

COM S 472 Foundations of Artificial Intelligence
Fall. 3 credits. Prerequisites: COM S 107 or COM S 212, COM S 280 and COM S 410. Open to juniors, seniors, and graduate students.
2 lecs, 1 sec.
A challenging introduction to the major subareas and current research directions in artificial intelligence. Topics include knowledge representation, search, problem solving, natural-language processing, vision, robotics, logic and deduction, planning, and machine learning.

COM S 473 Practicum in Artificial Intelligence
Fall. 2 credits. Prerequisite: COM S 107 or COM S 212, COM S 280 and COM S 410. Corequisite: COM S 472.
1 lab.
Project portion of COM S 472. Topics include Common LISP programming, representation systems, deductive retrieval, databases and frame languages, and truth-maintenance-system implementations.

COM S 481 Introduction to Theory of Computing
Fall. 4 credits. Prerequisite: COM S 280 or permission of instructor. Credit will not be granted for both COM S 381 and COM S 481. Corrective transfers between COM S 481 and COM S 381 (in either direction) are encouraged during the first few weeks of instruction.
3 lecs.
A faster-moving and deeper version of COM S 381.

COM S 482 Introduction to Analysis of Algorithms
Spring. 4 credits. Prerequisites: COM S 410 and either 381 or 481, or permission of instructor.
3 lecs.
Techniques used in the creation and analysis of algorithms. Combinatorial algorithms, computational complexity, NP-completeness, and intractable problems.

COM S 486 Applied Logic (also Mathematics 486)
Fall or summer. 4 credits. Prerequisites: Mathematics 222 or 294, COM S 100, and some additional course in mathematics or theoretical computer science. Not offered every year.
2 lecs, 1 lab to be arranged.
Propositional and predicate logic, compactness and completeness by tableaux, natural deduction, and resolution. Equational logic. Herbrand Universes and unification. Rewrite rules and equational logic, Knuth-Bendix method and the congruence-closure algorithm and l-calculus reduction strategies. Topics in Prolog, LISP, ML, or Nuprl. Applications to expert systems and program verification.

COM S 490 Independent Reading and Research
Fall, spring. 1–4 credits.
Independent reading and research for undergraduates.

COM S 511 Modern Programming Languages
Spring. 4 credits. Prerequisites: COM S 410 and a project course or permission of instructor.

Current trends in programming languages, with emphasis on programming methodologies supported by languages. Topics will include object-oriented programming, modularity and data abstraction, functional and declarative programming, concurrency, logic programming, and programming language design. There will be programming exercises in several new languages.

COM S 514 Practical Distributed Computing
Spring. 4 credits. Prerequisites: COM S 414 or permission of instructor.
Practical issues in designing and implementing distributed software. Topics include local and wide-area network protocols, replicated data, dynamic reconfiguration, monitoring for and reacting to failures or recoveries, distributed computation, synchronization, and techniques for expressing coarse-grained parallelism at the application level.

COM S 572 Artificial Intelligence Programming
Fall. 4 credits. Prerequisite: COM S 472 or permission of instructor.
3 lecs.
Review of Common LISP programming and an overview of AI programming techniques. Discussion focuses on practical issues faced by implementors of large LISP systems. Topics may include discrimination nets, agendas, deductive retrievers, slot and filler databases, backtracking problem solvers, and truth-maintenance systems. Students will be expected to implement several of the systems discussed in class.

COM S 600 Computer Science and Programming
Fall. 1 credit. Prerequisite: graduate standing in computer science or permission of instructor.
1 lec.
An introduction to practical, modern ideas in programming methodology. Covers style and organization of programs, basic techniques for presenting proofs of correctness of programs, and the use of a "calculus" for the derivation of programs.

COM S 611 Advanced Programming Languages
Fall. 4 credits. Prerequisites: COM S 410 and 381 or 481, or permission of instructor.
3 lecs.
A study of programming paradigms; functional, imperative, and logic programming. The untyped lambda-calculus. The typed lambda-calculus, type systems, polymorphism, type inference. Formal semantics of programming languages. Elements of domain theory and type theory. Models of programming logic.

COM S 612 Compiler Design for High-Performance Architectures
Spring. 4 credits. Prerequisites: COM S 314 and 412 or permission of instructor.
3 lecs.
Compiler design for pipelined and parallel architectures. Program analysis: data and control dependencies, dataflow analysis, efficient solution of dataflow equations, dependence tests, solution of Diophantine equations. Architecture and code generation for instruction-level parallel (ILP processors: pipelined, VLIW and superscalar architectures, code reorganization and software pipelining. Architecture and code generation for multiprocessors: shared- and distributed-memory architectures, latency tolerance and avoidance, loop transformations to enhance parallelism and locality of reference.

COM S 613 Concurrent Programming
Fall. 4 credits. Prerequisite: COM S 414 or permission of instructor.
3 lecs.
Advanced techniques in, and models of, concurrent systems. Synchronization of concurrent processes; parallel programming languages; deadlock; verification.

COM S 614 Advanced Systems
Spring. 4 credits. Prerequisite: COM S 414 or permission of instructor.
2 lecs.
An advanced course in systems, emphasizing contemporary research in distributed systems. Topics may include communication mechanisms, consistency in distributed systems, fault-tolerance, knowledge and knowledge-based protocols, performance, scheduling, concurrency control, and authentication and security issues.

COM S 621 Matrix Computations
Fall. 4 credits. Prerequisites: Mathematics 411 and 431 or permission of instructor.
3 lecs.
Stable and efficient algorithms for linear equations, least squares, and eigenvalue problems. Direct and iterative methods are considered. The Matlab system is used extensively.

COM S 622 Numerical Optimization and Nonlinear Algebraic Equations
Spring. 4 credits. Prerequisite: COM S 621.
3 lecs.
Modern algorithms for the numerical solution of multidimensional optimization problems and simultaneous nonlinear algebraic equations. Emphasis is on efficient, stable, and reliable numerical techniques with strong global convergence properties: quasi-Newton methods, modified Newton algorithms, and trust-region procedures. Special topics may include large-scale optimization, quadratic programming, and numerical approximation.

COM S 624 Numercial Solution of Differential Equations
Spring. 4 credits. Previous exposure to numerical analysis, mathematical analysis including Fourier methods, and differential equations.
3 lecs.
Finite difference and spectral methods for the solution of differential equations. A fast-moving course that begins with a three-week survey of numerical methods for ODEs, then moves on to Fourier analysis and methods for PDEs, especially parabolic and hyperbolic equations. Other topics covered include numerical stability, the treatment of boundary conditions, and multigrid methods. This course combines theory and programming (in Matlab), emphasizing fundamental principles more than applications.

COM S 635 Automatic Text Processing and Information Retrieval
Spring. 4 credits. Prerequisite: COM S 410 or equivalent or permission of instructor.
2 lecs.
Modern methods for natural language text processing. Topics include text analysis, storage and retrieval, automatic spelling aids, text compression and encryption, language understanding systems, automatic abstracting, and text generation and translation.

COM S 661 Robotics
Fall. 4 credits. Prerequisites: COM S 482 and permission of instructor. Not offered every year.
3 lecs.
State-of-the-art in theoretical and experimental robotics, with an emphasis on robot-motion planning. Topics include: Task-level robot planning, collision-free path planning, grasp synthesis, modeling and propagating uncertainty, planning compliant motions for precision assembly, geometrical planning theories, motion planning with dynamics (and dynamic constraints), computational complexity of robot-motion planning, computational theories of friction, impact, and the physics of manipulation, and error detection and recovery in robotics.

COM S 662 Robotics Laboratory
Fall. 1 credit. Prerequisite: graduate standing or permission of instructor. Not offered every year.
1 lab.
Introduction to the use of equipment and techniques in a modern robotics laboratory. Includes VAL programming, force sensing, compliant motion, and mechanical assembly.

COM S 664 Machine Vision
Spring. 4 credits. Prerequisites: undergraduate-level understanding of algorithms and Math 221 or equivalent.
3 lecs.
An introduction to computer vision. The following topics will be covered: edge detection, image segmentation, stereopsis, motion and optical flow, shape reconstruction, shape representations and extracting shapes from images, model-based recognition. Students will be required to implement several of the algorithms covered in the course and evaluate them on both synthetic and real images.

COM S 671 Introduction to Automated Reasoning
Fall. 4 credits. Prerequisites: COM S 611 and 681 and Mathematics 581. Not offered every year.
3 lecs.
Methods to automate reasoning in mathematics, including decision procedures, theorem provers, and formal proof tactics. Various implemented systems such as Edinburgh LCF, Cornell's Nuprl, and the Boyer and Moore theorem prover may be studied. Special topics may include proofs-as-programs, reflection, control operators to interpret classical logics, and parallel theorem proving.

COM S 672 Advanced Artificial Intelligence
Spring. 4 credits. Prerequisite: COM S 472 or permission of instructor.
2 lecs.
Advanced course in the computational study of intelligent behavior. Covers current issues in the design and implementation of agents that operate in the face of limited computational, perceptual, and effectory resources. How agents choose action (planning) and how they improve action choice using feedback from the world (learning) are the chief topics. Heuristic research with limited resources, planning in dynamic worlds, representations change, reasoning under uncertainty, active learning, knowledge assimilation, AI applications to engineering problems, and building integrated intelligent agents are covered. Exercises include building a small mobile robot and programming a player for a video game.

COM S 681 Analysis of Algorithms
Fall. 4 credits. Prerequisite: COM S 381 or 481, or permission of instructor.
3 lecs.
Methodology for developing efficient algorithms, primarily for graph theoretic problems. Understanding of the inherent complexity of natural problems via polynomial-time algorithms, randomized algorithms, NP-completeness, randomized reducibilities. Additional topics such as parallel algorithms and efficient data structures.

COM S 682 Theory of Computing
Spring. 4 credits. Prerequisite: COM S 381 or 481, or permission of instructor.
3 lecs.
Advanced treatment of theory of computation, computational-complexity theory, and other topics in computing theory.

COM S 684 Introduction to Symbolic Computation
Spring. 4 credits. Prerequisites: COM S 381 or 481, or permission of instructor.
3 lecs.
Introduction to the algorithms used for algebraic problems in symbolic computing and their mathematical and complexity theoretic foundations. Topics include simplication of, and arithmetic operations with, continued fractions, polynomials, rational functions and elements of algebraic extensions, polynomial factorization, and techniques for questions in algebraic geometry. Related topics may also be included.

COM S 709 Computer Science Graduate Seminar
Fall, spring. 1 credit. S-U grades only. For staff, visitors, and graduate students interested in computer science.
A weekly meeting for the discussion and study of important topics in the field.

COM S 711 Topics in Programming Languages and Systems
Spring. 4 credits. Prerequisites: COM S 381 or 481, and 611, or permission of instructor. Not offered every year.
2 lecs.
Topics are chosen at instructor's discretion.

[COM S 712 Topics in Programming Languages and Systems
Spring. 4 credits. Prerequisite: COM S 612 or permission of instructor. Not offered every year.
2 lecs.
Topics are chosen at instructor's discretion.]

COM S 713 Seminar in Systems and Methodology
Fall, spring. 4 credits. Prerequisites: COM S 414 and an advanced Systems course such as COM S 613, 614, 632, or 643, or permission of instructor. Not offered every year.
Discussion of contemporary issues in systems and methodology.

[COM S 714 Distributed Computing
Spring. 4 credits. Prerequisites: COM S 414 and an advanced systems course such as COM S 613, 614, 632, or 643, or permission of instructor. Not offered every year.
2 lecs.
Principles of distributed computing and their application to fundamental problems. Considerable time will be devoted to modeling distributed computations, the theory of concurrency control, security and protection, and issues in fault tolerance (including consensus problems). Other topics may be optimal resource placement, cache management, the specification of distributed programs, and randomized protocols.]

COM S 715 Seminar in Programming Refinement Logics
Fall, spring. 4 credits. Prerequisite: permission of instructor.
Topics in programming logics, possibly including type theory, constructive logic, decision procedures, heuristic methods, extraction of code from proofs, and the design of proof-development and problem-solving systems.

COM S 717 Topics in Parallel Architectures
Fall. 4 credits. Prerequisite: COM S 612 or permission of instructor. Not offered every year.
2 lecs.
Covers topics in parallel computers. Material includes: architectures of parallel computers, parallelizing compilers, operating systems for parallel computers, and languages (functional and logic-programming languages) designed for parallel computation.

COM S 719 Seminar in Programming Languages
Fall, spring. 4 credits. Prerequisite: COM S 611 or permission of instructor. S-U grades only.

COM S 721 Topics in Numerical Analysis
Fall. 4 credits. Prerequisite: COM S 621 or 622, or permission of instructor. Not offered every year.
2 lecs.
Topics are chosen at instructor's discretion.

COM S 722 Topics in Numerical Analysis
Spring. 4 credits. Prerequisite: COM S 621 or 622. Not offered every year.
2 lecs.
Topics are chosen at instructor's discretion.

COM S 729 Seminar in Numerical Analysis
Fall, spring. 1–4 credits (to be arranged). Prerequisite: permission of instructor. S-U grades only.

[COM S 733 Topics in Information Processing
Not offered every year.
2 lecs.
Topics are chosen at instructor's discretion.]

COM S 739 Seminar in Text Processing and Information Retrieval
Fall, spring. Credit to be arranged. Prerequisite: COM S 635 or permission of instructor. S-U grades only.

[COM S 743 Topics in Fault-Tolerant Distributed Computing
Prerequisites: COM S 614, 643, or 714. Not offered every year. Not offered 1992–93.
1 lec.
A study of the latest results and an exploration of open questions in the area of fault-tolerant distributed computing. Topics may include failure models, reliable broadcasts, synchronization, knowledge, and network partitioning. This course is particularly suited to students interested in pursuing research in this area.]

[COM S 747 Seminar in Program Logic and Semantics
4 credits. Prerequisite: permission of instructor. S-U grades only. Not offered every year.]

[COM S 749 Seminar in Systems Modeling and Analysis
Fall, spring. 4 credits. Prerequisite: permission of instructor. Not offered every year.
Discussion of advanced topics in modeling and analysis of computer systems and networks, with emphasis on performance.]

COM S 753 Seminar on Work in Progress in Distributed Systems
Fall, spring. 1 credit. Prerequisite: permission of instructor.
A weekly meeting to discuss research problems of interest to the participants. Topics include theoretical and practical aspects of distributed and fault-tolerant computing systems.

[COM S 762 Robot Café
Spring. 4 credits. Prerequisite: COM S 661. Not offered every year.
Advanced seminar on varying topics.]

[COM S 771 Topics in Artificial Intelligence
4 credits. Prerequisite: permission of instructor. Not offered every year.]

COM S 772 Seminar in Advanced Robotics
4 credits. Prerequisite: permission of instructor. Not offered every year.

COM S 773/774 Proseminar in Cognitive Studies I and II (also Cognitive Studies, Philosophy, Linguistics, and Psychology 773–774)
Fall-spring. 2 credits.
R 1:25–2:40. Staff (taught jointly by faculty from Cornell's Cognitive Studies Program, representing fields of computer science, linguistics, philosophy, and psychology).
This is a year-long lecture-and-discussion course which is intended to provide graduate students with an interdisciplinary introduction to the study of knowledge, its presentation, acquisition, and use. Topics may include the psychology of perception and cognition; the philosophy of mind, language, and knowledge; the phonology, syntax, and semantics of natural language; computational approaches to natural language processing, vision, and reasoning; parallel distributed processing; and neuropsychology.

COM S 779 Seminar in Machine Learning
Fall, spring. Credit to be arranged. Prerequisite: permission of instructor. S-U grades only.

[COM S 781 Topics in Analysis of Algorithms and Theory of Computing
Fall. 4 credits. Prerequisites: COM S 681 and 682, or permission of instructor. S-U grades only. Not offered 1992–93.
2 lecs.
Topics are chosen at instructor's discretion.]

[COM S 782 Topics in Analysis of Algorithms and Theory of Computing
Spring. 4 credits. Prerequisites: COM S 681 and 682, or permission of instructor. S-U grades only. Not offered 1992–93.
2 lecs.
Topics are chosen at instructor's discretion.]

COM S 784 Seminar in Computational Algebra
Fall, spring.
Informal weekly seminar in which current topics in computational algebra and symbolic mathematics are discussed.

COM S 789 Seminar in Theory of Algorithms and Computing
Fall, spring. 2–4 credits. Prerequisite: permission of instructor. S-U grades only.

COM S 790 Special Investigations in Computer Science
Fall, spring. Prerequisite: permission of a computer science adviser. Letter grade only. Independent research or Master of Engineering project.

COM S 890 Special Investigations in Computer Science
Fall, spring. Prerequisite: permission of a computer science adviser. S-U grades only. Master of Science degree research.

COM S 990 Special Investigations in Computer Science
Fall, spring. Prerequisite: permission of a computer science adviser. S-U grades only. Doctoral research.

ELECTRICAL ENGINEERING

Core Courses

ELE E 210 Introduction to Electrical Systems (also ENGRD 210)
Fall, spring. 3 credits. Prerequisites or corequisites: Mathematics 294 and Physics 213.
3 lecs and optional tutorial sections.
For description see Engineering Common Courses.

ELE E 230 Introduction to Digital Systems (also ENGRD 230)
Fall, spring. 4 credits. Prerequisite: COM S 100.
2 lecs, 5 lab experiments.
For description see Engineering Common Courses.

ELE E 301 Electrical Signals and Systems I
Fall. 4 credits. Prerequisites: a grade of at least C+ in Engr 210 and C in Mathematics 293 and 294.
3 lecs, 1 rec.
Continuous- and discrete-time signals and systems; Fourier series and transforms; bilateral Laplace and z transforms; convolution; FFTs and DFTs; applications to modulation, filtering, and sampling.

ELE E 302 Electrical Signals and Systems II
Spring. 4 credits. Prerequisite: ELE E 301.
3 lecs, 1 rec-computing session.
Linear time-invariant systems as models for electrical networks; network topology; nodal analysis, loop analysis, modified nodal analysis, and state variable analysis; unilateral Laplace transforms for solving vector differential equations; passivity and related energy storage concepts; elementary nonlinearities.

ELE E 303 Electromagnetic Fields and Waves
Fall, summer co-op session. 4 credits. Prerequisites: grades of C or better in Physics 213, 214, and Mathematics 294.
2 lecs, 1 rec.
Electrostatics, magnetostatics, quasistatics; electromagnetic energy and force; Maxwell's equations in integral and differential form; Poynting's theorem; wave equation; plane electromagnetic waves, phase and group velocities, dispersive media; wave reflection and transmission; dielectric and conducting interfaces; guided waves on finite-transmission lines; transient pulse propagation.

ELE E 304 Electromagnetic Fields and Applications
Spring. 4 credits. Prerequisite: ELE E 303.
3 lecs, 1 rec.
Theory of electromagnetic fields and waves building on the foundation established in ELE E 303; recommended for students interested in electrophysics. Electrostatics and magnetostatics: energy and forces in static fields. Wave propagation: conducting and dielectric guiding structures. Anisotropic media such as plasmas and ferrites. Dispersion of signals. Elements of electromagnetic properties of dielectrics, magnetic materials, and superconductors. Antennas and radiation: elemental radiators and linear antenna arrays. Transmitting-receiving relations. Radar and scattering cross section. Introduction to active microwave devices.

ELE E 306 Fundamentals of Quantum and Solid-State Electronics
Spring. 4 credits. Prerequisites: Physics 214 and Mathematics 294.
3 lecs, 1 rec-computing session.
Introductory quantum mechanics and solid-state physics necessary for understanding lasers and modern solid-state electronic devices. Quantum mechanics is presented in terms of wave functions, operators, and solutions of Schroedinger's equation. Topics include the formalism and methods of quantum mechanics, the hydrogen atom. the structure of simple solids, energy bands, Fermi-Dirac statistics, and the basic physics of semiconductors. Applications studied include a simple metal, thermionic emission, and the p-n junction.

ELE E 308 Fundamentals of Computer Engineering
Spring. 4 credits. Prerequisite: ELE E 230.
3 lecs, 1 rec-computing session.
An introduction to theoretical topics basic to computer engineering: discrete mathematics; structured computer organization; data structures and algorithms; and computer arithmetic. Practical applications of these concepts.

ELE E 310 Introduction to Probability and Random Signals
Spring. 4 credits. Prerequisite: Mathematics 294. This course may be used in place of Engr 260 to help satisfy the enginering distribution requirement. It can then also meet a field requirement if 3 additional credits of technical elective are taken.
3 lecs, 1 rec-computing session.
Introduction to the theory of probability as a basis for modeling random phenomena and signals, calculating the response of systems incorporating these models, and making estimates, inferences, and decisions in the presence of chance and uncertainty. Applications of these models will be given in such areas as communications, control, and device modeling. Specific topics include the basic concept of probability and its representations through densities, cumulative distribution functions, and characteristic functions; conditional probability; independence; scalar and vector random variables and nonlinear transformations of data; expectation, conditional expectation, moments, correlation; laws of large numbers and central limit theorem; linear least mean square estimation; Bayes and Neyman-Pearson decision making.

ELE E 315 Electrical Laboratory I
Fall. 5 credits. Prerequisite: a grade of at least C+ in Engr 210. Satisfies college technical writing requirement.
2 lecs, 2 labs.
Basic electrical and electronic instrumentation and measurements involving circuits and fields of both active and passive elements; an experimental introduction to solid-state devices. Introduction of the personal computer as a laboratory aid.

Computer Engineering

ELE E 230 Introduction to Digital Systems
Fall, spring. 4 credits.
For description see Core Courses.

ELE E 423 Computer Methods for Circuit Simulation
Fall. 4 credits. Prerequisite: ELE E 302. Satisfies undergraduate computer-applications requirement.
3 lecs, open lab.
Numerical techniques presented in the context of circuit simulation. Solution of linear and nonlinear algebraic equations; integration; solution of ordinary differential equations; alternative forms of circuit-equation formulation. Starting from a program to simulate simple, linear passive, steady-state circuits, the instructor will add, and the students improve on, procedures that will finally result in a nonlinear transient integrated-circuit simulator that involves most of the techniques discussed in class.

ELE E 445 Computer Networks and Telecommunications I
Fall. 3 credits. Prerequisites: ELE E 308 (or COM S 280 and 314), a course in probability, and programming at the level of COM S 211.
3 lecs.
Methods and approaches in the design, analysis, and implementation of local area networks and public data networks; circuit switching, packet switching; carrier-sense multiple access with collision detection, token passing; ethernets, busses, and rings; roles and functions of protocols; layering and ISO models.

ELE E 475 Computer Structures
Fall. 4 credits. Prerequisite: ELE E 308 (or COM S 280 and 314).
3 lecs, 1 lab.
Methods of designing digital computers and the hardware-software interface to the systems they function with. Topics will include types of control sequencers, memory and I/O organization and interfacing, interrupt hardware design, floating-point hardware and basic architectural alternatives. Laboratory groups will design and build a small digital computer. User-programmable logic devices will be employed for circuit implementation.

ELE E 524 Differential Equation Numerical Methods for the Electrical Engineer
Spring. 4 credits. Prerequisites: ELE E 301 and ELE E 303. ELE E 423 is helpful. A working knowledge of a scientific programming language is required. Open to both undergraduates and graduates. Satisfies undergraduate computer applications requirement.
3 lecs, open lab.
Numerical methods for ordinary and partial differential equations are presented using examples from different areas of electrical engineering. Examples include semiconduc-

tor-device simulation, plasma simulation, propagation of solitons in optical fibers, and the modeling of electrostatic fields in micromechanical devices. Numerical methods include particle-in-cell simulation techniques; spectral methods; elementary parabolic, elliptic, and hyperbolic methods; and the boundary-element method. The fundamental notions of accuracy and error, consistency, stability, and convergence are discussed.

ELE E 539 VLSI Digital-System Design
Fall and spring. 6 credits (must be taken both semesters). Prerequisite: ELE E 475 or consent of instructor.
Fall: 3 lecs, 1 computing sec; spring: 1 lec, 1 lab.
Custom VLSI design as seen by a system designer. Switches as logic devices, MOS transistor, MOS logic design, two-phase clocking, stick diagrams, cell layout, regular control structures, simulation, performance analysis, RC timing model, system design for performance, design for testing, semicustom design, systolic arrays, CAD design tools. A chip design project and design report are required for fall semester. CAD tools are used extensively. Chips are tested for functionality and performance, and the design report is revised during the spring semester.

ELE E 541 Advanced Computer Architectures
Fall. 3 credits. Prerequisite: ELE E 308 (or COMS 280 and 314).
Design and evaluation of processor architectures are examined in the light of actual implementations of both large-scale and small-scale systems. Topics include microprogramming, parallel and pipelined architectures, interleaved memories, cache and virtual memories, I/0 processors, vector and array processors, protection mechanisms, and RISC architectures.

ELE E 542 Parallel Processing
Spring. 3 credits. Prerequisite: ELE E 541.
3 lecs.
Computer architecture for parallel processors that are designed to provide a high computation rate for large scientific problems; primary emphasis on image processing and highly parallel VLSI-based systems. Other applications considered include signal processing and the solution of PDEs. Performance, processor interconnections, algorithms, programming techniques, and fault tolerance will be discussed. Architecture types to be considered include binary-array processors, pipeline processors, inner-product computers, systolic arrays, and MIMD systems.

ELE E 543 VLSI Architectures and Algorithms
Spring. 3 credits. Prerequisite: ELE E 541.
3 lecs.
Since the advent of VLSI, the cost of processing logic is no longer a fundamental constraint on the design of computer architectures. Problems that once were computationally intractable can now be solved on arrays of thousands or even tens of thousands of processors. This course addresses the important question: What are the optimal VLSI structures and algorithms for specific classes of problems? The architectures we will examine include systolic arrays, mesh-connected processors, and data-flow computers; special attention will be given to problems that arise in real-time signal processing.

[ELE E 546 Computer Networks and Telecommunications II
Spring. 3 credits. Prerequisite: ELE E 445 or consent of instructor. Not offered 1992–93.
3 lecs.
Introduction to Integrated Service Digital Network (ISDN); circuit switching fundamentals; time division architectures; packet switching architectures; integration of circuit and packet switching; evolution from ISDN to Broadband ISDN.]

ELE E 547 Computer Vision
Fall. 4 credits. Prerequisites: ELE E 308 (or COM S 280 and 314) or consent of instructor.
3 lecs.
Computer acquisition and analysis of image data with emphasis on techniques for robot vision. Computer vision is the construction of explicit meaningful descriptions of physical objects from images. This course will concentrate on descriptions of objects at three levels of abstraction: segmented images (images organized into subimages that are likely to correspond to interesting objects), geometric structures (quantitative models of image and world structures), and relational structures (complex symbolic descriptions of images and world structures). The programming of several computer-vision algorithms will be required.

ELE E 548 Image Processing
Spring. 4 credits. Prerequisite: ELE E 308 (or COM S 280 and 314) and ELE E 425, or consent of instructor.
3 lecs.
Image formation and perception, digitization, image coding, image enhancement, image restoration, computerized tomography, optical processing, image warping. The programming of several image-processing algorithms will be required.

ELE E 563 Communication Networks
Fall. 4 credits.
For description see Communication and Information Systems.

ELE E 576 Advanced Digital Systems Design
Spring. 4 credits. Prerequisite: ELE E 475.
3 lecs, 1 lab.
Design of sophisticated digital systems using microprocessor-based embedded controller systems. Students working in small groups will design, debug, and construct several small systems that illustrate and employ the techniques of digital system design acquired in previous courses. Content centered in laboratory work; lectures primarily for the introduction of examples, description of the specific modules to be designed, and instruction in the hardware and high-level design tools to be employed. Lab environment is that of ELE E 475 with the addition of an integrated single-board computer. Programming in assembly language and C.

ELE E 595 Applications of Physics to Computation
Fall. 2 credits. Prerequisites: analytic interest and familiarity with linear algebra and vector calculus.
Mathematics is traditionally used to solve physical problems. However, occasionally this trend gets reversed and physical ideas are useful in solving mathematical problems, e.g.; during the last decade, physical ideas were used in deriving insights into computation in at least three well-known instances: simulated annealing, neural networks, and chaos. This course will discuss some aspects of the above three and other recent applications of physics to computing.

Circuits, Systems, and Signal Processing

ELE E 210 Introduction to Electrical Systems
Fall, spring. 3 credits.
For description see Engineering Common Courses.

ELE E 230 Introduction to Digital Systems
Fall, spring. 4 credits.
For description see Core Courses.

ELE E 301 Electrical Signals and Systems I
Fall. 4 credits.
For description see Core Courses.

ELE E 302 Electrical Signals and Systems II
Spring. 4 credits.
For description see Core Courses.

[ELE E 318 Electric and Electromechanical Circuits and Systems
Spring. 3 credits. Prerequisite: ELE E 315. Not offered 1992–93.
Integrated lecs and lab.
Concepts and methods for design, construction, testing, and analysis of a variety of electronic circuits and for modeling and analysis of electromechanical devices such as speakers, solenoids, and a variety of motors.]

ELE E 320 The Audio Engineering Laboratory: An Introduction To Audio Signal Processing
Spring. 3 credits. Prerequisites: ELE E 301 and ELE E 315.
The Audio Engineering Laboratory provides each student with crucial hands-on laboratory experience in applying signals and systems concepts. Students are paired into teams; each team will design, construct, and test simple analog and digital audio circuits and programs. The course builds intuition into signal processing, valuable not only for audio, but also for general communication and control systems as well. The students achieve valuable experience with practical laboratory tools and techniques, and, in addition, develop critical technical writing and presentation skills.

ELE E 423 Computer Methods for Circuit Simulation
Fall. 4 credits.
For description see Computer Engineering.

ELE E 425 Digital Signal Processing
Fall. 4 credits. Prerequisite: ELE E 301.
3 lecs, 1 lab.
Fundamentals of signal analysis, review of Fourier, Laplace, and Z transforms. Sampling theory. Discrete Fourier transform properties and computation (FFT). Digital filter design; the approximation problem for FIR and IIR filters, the realization problem–finite word-length limitations and filter structures.

ELE E 426 Applications of Signal Processing
Spring. 3 or 4 credits. Prerequisite: ELE E 425.
1 lec, 2 labs.
Applications of signal processing, including signal analysis, filtering, and signal synthesis. The course is laboratory oriented and

emphasizes individual student projects. Design is done with signal-processing hardware and by computer simulation. Topics include filter design (principally digital filtering) and spectral analysis as well as speech coding, speech processing, digital recording, adaptive noise cancellation, and digital signal synthesis.

ELE E 521 Theory of Linear Systems
Fall. 4 credits. Prerequisite: ELE E 302 or permission of instructor. Recommended: a good background in linear algebra and linear differential equations.
3 lecs.
State-space and input-output linear systems in discrete and continuous time. Transition matrices, the matrix exponential, and the Cayley-Hamilton theorem. Controllability, observability, stability, realization theory. At the level of *Linear Systems*, by T. Kailath.

ELE E 522 Nonlinear Systems: Analysis, Stability, Control, and Applications
Spring. 4 credits. Prerequisites: ELE E 521 or a solid background in linear algebra and real analysis strongly recommended but not required.
A fairly rigorous introduction to nonlinear systems, including nonlinear differential equations, flows, phase-plane analysis, fundamentals of Lyapunov theory; LaSalle's Theorem; regions of attraction, slowly varying systems, advanced stability theory Lyapunov redesign; applied nonlinear control, describing functions, perturbation theory, averaging and singular perturbations; bifurcation analysis and control and application to physical systems.

ELE E 526 Advanced Signal Processing
Spring. 4 credits. Prerequisites: ELE E 425 and ELE E 521.
3 lecs, 1 lab.
Sampling and signal reconstruction. Approximation theory. Linear inversion theory. Exponential signal modeling. Spectral estimation. Wavelets.

ELE E 528 Multisensor Digital Signal Processing
Spring. 4 credits. Prerequisite: ELE E 301 and 411. ELE E 425 recommended.
Addresses signal processing techniques for the coordinated use of data derived from an array of sensors. Application areas for sensor arrays include radar, geophysics, speech enhancement, and satellite comunications. We will discuss propagation and sensor models, beamforming, sidelobe cancellers, source location and direction finding, adaptive detection and estimation, computational approaches (RLS, LMS, and square root) and architectures (systolic arrays and other concurrent schemes). Assignments will involve computer simulations.

ELE E 548 Image Processing
Spring. 4 credits.
For description see Computer Engineering.

ELE E 674 Adaptive Parameter Estimation Theory
3 credits.
For description see Power and Control Systems.

ELE E 679 Advanced Topics in Systems and Control
1–3 credits.
For description see Power and Control Systems.

Communication and Information Systems

ELE E 310 Probability and Random Signals Spring. 4 credits.
For description see Core Courses.

ELE E 411 Random Signals in Communications and Signal Processing
Fall. 3 credits. Prerequisite: ELE E 302 and 310 or equivalent.
3 lecs.
Introduction to probability models for random signals in discrete and continuous time; Markov chains, Poisson process, queuing processes, wide-sense stationary processes and power spectral densities, Gaussian random process, including the narrowband case. Electrical engineering phenomena described by such models (e.g., communications channel noise, queues that form in multiple-access telecommunications systems). Response of linear and nonlinear systems to random signals. Elements of estimation and inference as they arise in communications and digital signal processing systems (e.g., problems of extraction of signals from noise via Wiener filtering, power spectral density estimation).

ELE E 445 Computer Networks and Telecommunications I
Fall. 3 credits.
For description see Computer Engineering.

ELE E 468 Communications Systems I
Spring. 4 credits. Prerequisite: ELE E 301 or 521, and 411 or equivalent.
Analog signal representation and filtering using Fourier and Hilbert transform techniques. Varieties of amplitude modulation (AM, DSBSC, SSB, VSB, QAM) and their demodulators. Frequency modulation and demodulation. Demodulation of AM and FM in the presence of noise. Sampling theorems and aliasing. Pulse amplitude modulation. Quantization for A/D conversion. Pulse code modulation. Elements of optimal signal parameter estimation. Application to commercial broadcasting and data transmission.

ELE E 546 Computer Networks and Telecommunications II
Spring. 3 credits.
For description see Computer Engineering.

ELE E 561 Error-Control Codes
Fall. 3 credits. Prerequisite: ELE E 301 or ELE E 521 or equivalent. A strong familiarity with linear algebra is assumed.
3 lecs.
An introduction to the theory of error-control codes: linear block codes, convolutional and other trellis codes. Hamming codes, minimum distance, standard array, minimum-distance decoding, cyclic codes. The dual of a code. Methods of shortening and combining codes. Hamming and Singleton bounds for error-correcting codes. Algebra: groups, rings, and fields with special emphasis on Galois or finite field theory. The construction and decoding of Bose-(Ray) Chaudhuri-Hocquenghem (BCH) and Reed-Solomon (RS) codes. Algebraic description of binary convolutional codes. Decoding algorithms and construction of Euclidean distance trellis codes.

ELE E 562 Fundamental Information Theory
Spring. 3 credits. Prerequisite: ELE E 310 or equivalent.
3 lecs.
Fundamental results of information theory with application to storage, compression, and transmission of data. Entropy and other information measures. Block and variable-length codes. Channel capacity and rate-distortion functions. Coding theorems and converses for classical and multiterminal configurations. Gaussian sources and channels.

ELE E 563 Communication Networks
Fall. 4 credits. Prerequisite: ELE E 310 or permission of instructor.
3 lecs.
Classical line-switched communication networks: point-process models for offered traffic; blocking and queuing analyses. Stability, throughput, and delay of distributed algorithms for packet-switched transmission of data over local- and wide-area communication networks: TDMA, FDMA, ALOHA, slotted ALOHA, Ethernet, reservation, tree, and interval-searched contention resolution protocols. Flow control and capacity assignment algorithms for wideband, robust networks. Simulation exercises for local and metropolitan area networks. Adaptive routing and ATM networks.

ELE E 564 Decision Making and Estimation
Spring. 4 credits. Prerequisite: ELE E 411.
An introduction to those methods of making rational decisions and inferences and of forming estimates that are central to problems of communications, detection, and statistical signal processing. Topics covered are drawn from utility theory and rational preferences; Bayes, minimax, and Neyman-Pearson decision theories; Bayes and maximum likelihood point estimation; Cramer-Rao bound, efficient, and consistent estimation; spectral estimation; and robust models for signal extraction.

ELE E 566 Queuing Networks
Spring. 4 credits. Prerequisite: ELE E 411 or equivalent.
Single-class and multiclass queuing network models of communication networks and computer networks. Little's formula. Jackson networks. Quasireversibility. Product-form networks. Output theorem. Analysis of sojourn times. Insensitivity. Server allocation and optimal routing problems. Bandit problems. Fluid, light traffic and heavy traffic approximations. Static and dynamic control of queuing networks. Regenerative simulation of performance measures. Fast simulation techniques. Perturbation analysis.

ELE E 567 Communication Systems II
Fall. 4 credits. Prerequisites: ELE E 411, 468.
This course presents the fundamental principles of the theory of digital communication. Analytical and computational tools required to understand the principles of modern data conversion, transmission, and storage systems are presented. PCM, DPCM, PAM, PSK, FSK, matched filtering, equalization, line codes, trellis codes, viterbi decoding, and applications to audio, video, and magnetic recording.

ELE E 577 Artificial Neural Networks
Fall. 3 credits. Prerequisites: ELE E 310; ELE E 411 recommended.
Artificial neural networks are brainlike in being formed out of many highly interconnected nonlinear memoryless elements. Probability theory will provide the primary

analytical approach to design and analysis of neural networks. The course will cover capabilities of feed-forward nets (multilayer perceptrons) that can serve as pattern classifiers, decision-making devices, and controllers, as well as aspects of recurrent/feedback/Hopfield nets that can serve as associative memories and combinatorial optimizers. At the level of the current literature.

ELE E 664 Foundations of Inference and Decision Making
Spring. 3 credits. Prerequisite: a course in probability and some statistics, or permission of instructor. Not offered every year.
3 lecs.
An examination of methods for characterizing uncertainty and chance phenomena and for transforming information into decisions and optimal systems. Discussion of the foundations of inference includes topics drawn from comparative probability, interval-valued probability, quantitative probability, relative frequency interpretations, computational complexity, randomness, classical probability and invariance, induction, and subjective probability.

ELE E 668–669 Random Processes in Electrical Systems
668, fall; 669, spring. 3 credits each term.
Advanced topics in the general area of randomness and uncertainty and their relevance to the analysis and design of electrical systems.

Power and Control Systems

ELE E 318 Electric and Electromechanical Circuits and Systems
Spring. 3 credits.
For description see Circuits, Systems, and Signal Processing.

ELE E 451–452 Computer-Aided Analysis of Electric Power Systems I and II
451, fall; 452, spring. 4 credits each term.
Prerequisite: ELE E 302.
3 lec-recs, 1 lab-computing session.
Representation of 3-phase power systems, modeling of synchronous machines; transmission lines; transformers; loads, introduction to spare matrix techniques, power-flow analysis, economic dispatch, optimal power flow, symmetrical components, fault studies, power-system protection, power-system stability, on-line power-flow analysis, voltage-control systems, and power-control systems. Special properties of electric power systems that enhance the efficiency of simulation tools used for their analysis. The Kettering Power System Laboratory's digital computer is used as a dynamic "laboratory."

ELE E 471 Feedback Control Systems
Fall. 4 credits. Prerequisite: ELE E 302 or M&AE 326, or permission of instructor.
3 lecs, open lab.
Analysis techniques, performance specifications, and analog-feedback-compensation methods for single-input, single-output, linear, time-invariant systems. Laplace transforms and transfer functions are the major mathematical tools. Design techniques include PID, root-locus, frequency response, and algebraic pole placement. Computer-aided design laboratory examines modeling and control of a computer-simulated dynamic process.

ELE E 472 Digital Control Systems
Spring. 4 credits. Prerequisite: ELE E 471 or permission of instructor.
3 lecs, open lab.
Analysis and design of feedback control systems using digital devices to implement compensation. Z-transforms and linear algebra are the major mathematical tools. Topics include: state realizations, digitizations of analog systems, least-squares system identification, state feedback control, observers, combined observer-controller, algebraic-control design, and simultaneous identification and control. Assignments will consist of reports on computer-aided controller design and digitally-simulated evaluation.

ELE E 555 Advanced Power Systems Analysis and Control I
Fall. 3 credits. Prerequisites: ELE E 302 and concurrent registration in 451, or permission of instructor.
Advanced static analysis of power systems. State estimation in power systems. Bad-data detection and identification. Static equivalent circuits of external power systems. Static contingency analysis and selection. Steady-state security assessment. Static bifurcation and voltage stability. Theoretical analysis of load flow equations.

ELE E 556 Advanced Power Systems Analysis and Control II
Spring. 3 credits. Prerequisite: ELE E 555 or permission of instructor.
Analysis of power-system components including rotating machines, excitation systems, automatic voltage regulation, boiler-turbine control, and speed regulation. Automatic Generation Control. Numerical simulations of mid-term and long-term power-system dynamics. Direct methods for power-system stability analysis. Dynamic equivalent circuits of external power systems. Dynamic contingency analysis and selection. Dynamic Security Assessment.

ELE E 564 Decision Making and Estimation
Spring. 4 credits.
For description see Communication and Information Systems.

[ELE E 573 Optimal Control and Estimation for Continuous Systems
Fall. 4 credits. Prerequisite: ELE E 521 or permission of instructor. Not offered 1992–93.
3 lecs.
Control system design through parameter optimization, with and without constraints. The minimum principle; linear regulations, minimum-time and minimal-fuel problems. Computational techniques; properties of Lyapunov and Riccati equations.]

ELE E 574 Estimation and Control in Discrete Linear Systems
Spring. 4 credits. Prerequisites: ELE E 521 and 411, or permission of instructor.
3 lecs.
Optimal control, filtering, and prediction for discrete-time linear systems. Approximation on discrete point sets. The principle of optimality. Kalman filtering. Stochastic optimal control.

ELE E 664 Foundations of Inference and Decision Making
Spring. 3 credits.
For description see Communication and Information Systems.

ELE E 679 Advanced Topics in Systems and Control
1–3 credits. Prerequisite: permission of instructor. Not offered every year.
Topics include robotics, nonlinear feedback system stability, multivariable control, and qualitative theory on nonlinear systems.

Solid-State Electronics

ELE E 306 Fundamentals of Quantum and Solid-State Electronics
Spring. 4 credits.
For description see Required Courses.

ELE E 412 Applied Solid-State Physics
Spring. 4 credits. Prerequisite: ELE E 306. ELE E 407 recommended.
3 lecs, 1 rec.
Review of basic solid-state concepts (lattice, primitive cell, reciprocal lattice, Brillouin zone). Lattice vibrations. The diatomic chain. Polarity of waves. Binding of crystals. Thermal properties of insulators and metals. Effective mass tensor. Magnetic flux quantization and the Fermi surface in metals. Plasmons, polaritons, and polarons. Charge-carrier scattering. Optical properties. Kramers-Kronig relations. Elements of superconductivity. Dia- and ferroelectric materials. Dia-, para-, ferro-, and antiferro-magnetism.

ELE E 433 Microwave Integrated Circuits
Fall. 4 credits; may be taken for 3 credits without laboratory. Prerequisites: ELE E 303 and ELE E 306.
3 lecs, 1 lab.
An introduction to the design and testing of high-speed circuits (frequencies above 1 GHz). Topics include: computer-aided design, automated microwave measurement techniques, optoelectronic applications, and GaAs monolithic microwave integrated circuits. Six two-week labs cover the basics of designing, fabricating, and testing microwave integrated circuits.

ELE E 453 Integrated Circuit Design
Fall. 4 credits. Prerequisites: ELE E 301 and ELE E 315 or equivalent. ELE E 457 recommended.
3 lecs, 1 lab.
Introduction to analysis and design of digital and analog MOS and bipolar integrated circuits (IC). Device models. Computer-aided design (layout, design rules, floor planning). Common building blocks for digital and analog applications (inverters, switches, single-stage units, sources, sinks, differential pairs, active loads). Steady-state and transient analysis, frequency response and noise. Overview of common IC designs (microprocessors, memories, amplifiers).

ELE E 457 Silicon Semiconductor Electronics
Fall. 4 credits with lab. Prerequisites: ELE E 315 and ELE E 306 or equivalent.
3 lecs, 1 lab.
Fundamental electronic properties of semiconductors. Energy-band diagrams, carrier transport and recombination, pn junctions, metal-semiconductor Schottky contacts, ohmic contacts, and metal-oxide-semiconductor (MOS) structures. Operation of bipolar junction transistors (BJTs) and field effect-transistors (FETs). Six two-week labs covering electrical measurements of semiconductor materials and devices.

ELE E 524 Differential Equation Numerical Methods for the Electrical Engineer
Spring. 4 credits.
For description see Computer Engineering.

ELE E 533 Semiconductor Lasers
Spring. 3 credit. Prerequisites: ELE E 430, ELE E 457, or permission of instructor.
3 lecs.
Study of principles and characteristics of semiconductor lasers. Topics cover laser dynamics, noise, quantum confined structures, single-frequency lasers, traveling-wave lasers, surface-emitting lasers, reliability, and emerging research subjects. A term project and paper will be required.

ELE E 534 Microwave Semiconductor Devices
Spring. 4 credits, may be taken for 3 credits without lab. Prerequisites: ELE E 433 and ELE E 457.
3 lecs, 1 lab.
Basic theory of operation of solid-state microwave and millimeter-wave devices: field-effect transistor (FET), high electron mobility transistor (HEMT), Schottky, IMPATT, Gunn, PIN, and tunnel devices. Emphasis on how to integrate these devices into practical circuits. Oscillators, amplifiers, and mixers will be fabricated and measured in the laboratory.

ELE E 535 Semiconductor Physics
Fall. 4 credits. Prerequisites: ELE E 457 and 407, or permission of instructor.
3 lecs.
Foundations of semiconductor physics for the description of carrier transport and optical characteristics of semiconductor materials and structures. Crystal structure and symmetry, energy-band structures, statistics, effective mass theorem, classical transport, scattering, high-field transport, quantum transport, optical absorption and reflection, photoconductivity, light generation, deep levels, and surface and interface phenomena. On or above the level of *Fundamentals of Semiconductor Theory and Device Physics*, by S. Wang.

ELE E 536 VLSI Technology
Spring. 4 credits. 3 credits without laboratory with permission of instructor. Prerequisite: ELE E 457 or ELE E 453 or ELE E 539, or permission of instructor.
3 lecs, 1 lab.
Processing technology for high-density silicon-integrated circuits of CMOS, BiCMOS, and ECL type. Lithography, oxidation, diffusion, ion implantation, thin-film deposition, dry etching, multilevel interconnect, process integration, manufacturing yield, integrated-circuit reliability, future of high-density VLSI and ULSI. Laboratory includes actual device and circuit in a clean room, measurements, and process simulations on engineering workstations. On the level of *VLSI Technology*, edited by S. M. Sze.

ELE E 537 Physical Design of High-Speed Computers
Fall. 3–4 credits. Prerequisites: ELE E 230 and 453 or 457 or 539; or permission of instructor. Recommended companion course: MS&E 463.
Integration of computer structures from integrated circuits to chips, modules, boards, and full computer systems, from workstations to supercomputers. Computer packaging architectures; high-speed electrical and optical signal distribution; power distribution and thermal management; functional architecture; manufacturing, measurement, and simulation methods; case studies on workstations, mainframes, and supercomputers; fundamental limits. On the level of *Principles of Electronic Packaging*, edited by Seraphim, Lasky, and Li. Lectures by outside speakers from the computer industry.

ELE E 538 Introduction to III–V Compound Semiconductor Materials
Spring. 3 credits. Prerequisites: ELE E 407 and 558 or equivalent.
An introduction to III–V compound semiconductor materials and their crystal growth technologies. Topics include the modern epitaxial growth technologies, Molecular Beam Epitaxy and Organometallic Vapor Phase Epitaxy; common methods used for the evaluation of compound semiconductor materials, including Raman spectroscopy. Emphasis is placed on the materials' properties and the related growth and characterization techniques that currently support a variety of research topics in new semiconductor devices.

ELE E 539 VLSI Digital-System Design
Fall and spring. 6 credits.
For description see Computer Engineering.

ELE E 554 Advanced VLSI Circuit Design
Spring. 4 credits. Prerequisite: ELE E 453 or equivalent.
3 lecs, 1 lab.
Integration of building blocks on chip. Overview of recent innovations in VLSI circuits. Feedback circuits. Operational amplifiers. Switched-capacitor circuits. Digital-to-analog and analog-to-digital converters. Dynamic and static memories. Programmable logic and gate arrays. Systems on chips (microprocessors, wafer-scale integration).

ELE E 558 Compound Semiconductor Electronics
Spring. 4 credits with lab. Prerequisites: ELE E 457 or equivalent.
3 lecs, 1 lab.
Electronic properties of advanced semiconductor structures using compound semiconductor materials and heterojunctions. Fundamentals of carrier transport and scattering. Properties of direct bandgap semiconductors and quantum wells. Advanced semiconductor devices including metal-semiconductor transistors (FETs), modulation-doped FETs, and heterojunction bipolar transistors (HBTs). High-frequency operation of compound semiconductor devices. Six two-week labs, which include low-temperature carrier transport, optical absorption and emission, and electrical characterization of compound semiconductor devices.

ELE E 636 Advanced Solid-State Devices
Spring. 3 credits. Prerequisites: ELE E 535 or ELE E 457, ELE E 407, ELE E 412, or equivalents.
3 lecs.
Carrier transport in semiconductors materials and structures including scattering, relaxation phenomena, hot-carrier effects, high fields, and tunneling. Detailed discussion of the influence of these processes on the properties of high-frequency and submicrometer-sized diodes and transistors. Performance limits of semiconductor devices. Computer modeling and simulation of small-sized and high-speed devices such as metal-oxide-field effect transistors (MOSFET) and heterojunction bipolar transistors (HBT).

ELE E 637 Radiation Effects in Microelectronics (also NS&E 621)
Fall. 3 credits. Prerequisites: permission of instructor. A seminar intended for seniors and graduate students in engineering or applied physics.
Two 1-1/2 hour lecs. S. C. McGuire.
An introduction to the physical processes that underlie the malfunction of microelectronic circuitry resulting from exposure to ionizing radiation. Basic device-failure mechanisms, including total-dose effects, single-event upsets, and latchup, as well as the roles that circuit testing and modeling methods play in improving circuit design. Impact of surface radiation typical of low-energy electron and photon sources on device fabrication. Reference materials from the current literature.

ELE E 638 Advanced Semiconductor Devices and Processes
Fall. 4 credits. Prerequisite: ELE E 535, ELE E 636, or permission of instructor. Not offered every year.
3 lecs, special project or term paper.
Advanced topics in solid-state electronic-device physics, fabrication methods, and materials for high-density silicon VLSI and high-speed compound semiconductor technologies. Concepts developed in ELE E 535 and 636 are applied to current state-of-the-art topics. On the level of IEEE Transactions on Electron Devices, *Journal of Applied Physics*, and current conference proceedings.

Quantum and Opto-Electronics

ELE E 306 Fundamentals of Quantum and Solid-State Electronics
Spring. 4 credits.
For description see Core Courses.

ELE E 407 Quantum Mechanics and Applications
Fall. 4 credits. Prerequisite: ELE E 306 or equivalent.
3 lecs, 1 rec.
Review of basic quantum mechanical concepts. Harmonic oscillator. Annihilation and creation operators. Application of the WKB approximation to bound states and transmission coefficients. Angular momentum. Raising and lowering operators. Addition of angular momentum. Radial equation. Effective potential. Hydrogen atom. Selection rules. Spin states. LS coupling. Pauli principle. Hybridization. Helium atom. Perturbation theory. Atom-radiation interaction. Golden rule. Sum rule. Thomas-Fermi atom. LCAO. Bound and anti-bound states. The quantum well. Density of states in the three dimensions. Degeneracy of Landau levels.

ELE E 430 Lasers and Optical Electronics
Fall. 3 credits. Prerequisite: ELE E 306 or equivalent.
3 lecs, 1 rec-lab.
An introduction to the operation of stimulated-emission devices such as lasers and devices based on linear and nonlinear optics. Material covered includes diffraction-limited optics, propagation of Gaussian laser beams, optical resonators, interaction of radiation with matter, physics of laser operation, laser design. Applications of coherent radiation to nonlinear optics, communication, and research will be discussed as time permits.

ELE E 524 Differential Equation Numerical Methods for the Electrical Engineer
Spring. 4 credits.
For description see Computer Engineering.

ELE E 530 Fiber and Integrated Optics
Spring. 4 credits with lab. Prerequisite: ELE E 303 or equivalent. ELE E 304 and ELE E 430 strongly recommended. 1-credit lab optional.
3 lecs, 1 lab.
Physical principles of optical waveguides, optical sources and detectors, noise, modulators, and sensing. Wave equation solutions to the mode structure in waveguides, mode coupling, dispersion and bandwidth limitations, optical sources based on semiconductors, detectors and noise, modulation techniques, nonlinear effects in optical waveguides, and optical sensors. System issues illustrate the physical limitations of devices. Laboratory includes demonstrations of optical coupling and waveguide characterization.

ELE E 531 Quantum Electronics I
Fall. 4 credits. Prerequisites: ELE E 306 and 407, or Physics 443.
3 lecs, 1 computing session.
A detailed treatment of the physical principles underlying lasers, related fields, and applications. Topics include the interaction of radiation and matter, including emission, absorption, scattering, and basic spectroscopic properties of key laser media; theory of the laser, including methods of achieving population inversions, dispersive effects, and laser oscillation spectrum.

ELE E 532 Quantum Electronics II
Spring. 4 credits. Prerequisite: ELE E 531 or permission of instructor.
3 lecs, 1 lec–computing session.
A continuation of ELE E 531. Topics include density matrix; nonlinear optical processes; properties of nonlinear optical materials; optical parametric oscillators; spontaneous and stimulated Raman and Brillouin processes; theory of coherence; pico- and femto-second optics; ultrafast processes in semiconductors and molecules; optical properties of semiconductor-doped glasses, quantum-well structures, and superlattices.

ELE E 535 Semiconductor Physics
Fall. 4 credits.
For description see Solid-State Electronics.

Plasmas and Large-Scale Fluids

ELE E 481 Experimental Plasma Physics and Gas Discharges
Fall. 4 credits. Co-requisite: ELE E 304 or A&EP 356 or equivalent. Fulfills electrical engineering laboratory requirement and constitutes an M.Eng.(Electrical) course pair with ELE E 480 or 484.
3 lecs, 1 lab.
Theory and practice of generation, control, and diagnostics of plasmas and intense particle beams. Coordinated lectures and nine experiments and a field trip. Plasma breakdown, collisions, diffusion, sheaths. Discussion of macroscopic and microscopic measurements. Reflex discharge, vacuum technology, plasma probing. Plasma processing of solid-state materials. Electromagnetic and space-charge-wave propagation and scattering. Microwave and optical radiation. Intense particle beams. Methods for data collection and analysis.

ELE E 484 Introduction to Controlled Fusion: Principles and Technology (also M&AE 559 and NS&E 484)
Spring. 3 credits. Prerequisites: ELE E 301 and 303, or permission of instructor. Intended for seniors and graduate students.
3 lecs.
For description see NS&E 484.

ELE E 486 Space Science and Engineering
Spring. 3 credits. Prerequisites: ELE E 301 and ELE E 303 or equivalent.
A survey of subjects relevant to spacecraft design. Astrodynamics and orbital maneuvers. Rigid-body dynamics and control. Communications. Black-body radiation and temperature control. Geospace environment. Remote sensing using electromagnetic techniques. Applications of these topics will be discussed where appropriate. At the level of *Design of Geosynchronous Spacecraft*, by Agrawal.

ELE E 487 Introduction to Antennas and Radar
Fall. 3 credits. Prerequisites: ELE E 304 (or at least a B in 303).
For description see Fields, Waves, and Antennas.

ELE E 524 Differential Equation Numerical Methods for the Electrical Engineer
Spring. 4 credits.
For description see Computer Engineering.

[ELE E 580 Applied Electrodynamics
3 credits (4 credits with project). Prerequisite: ELE E 581 or ELE E 583 or permission of instructor. Not offered 1992–93.
Contemporary electrodynamics with emphasis placed on applications. Theory, design, and use of high-power microwave devices, such as gyrotons, CARMs, free-electron lasers, and traveling-wave tubes. Electromagnetic waveguide and cavity modes, charged-particle orbit theory, particle dynamics in electromagnetic fields, field transforms, electron beam generation, equilibria, waves on beams, low- and high-power microwave devices and their applications. Project based on the numerical simulation of microwave devices.]

ELE E 581 Introduction to Plasma Physics
Fall. 4 credits. Prerequisites: ELE E 303 and ELE E 304 or equivalent. First-year graduate-level course; open to exceptional seniors with permission of instructor.
3 lecs.
Plasma state; motion of charged particles in fields; drift-orbit theory; coulomb scattering, collisions; ambipolar diffusion; elementary transport theory; two-fluid and hydromagnetic equations; plasma oscillations and waves, CMA diagram; hydromagnetic stability; elementary applications to space physics and controlled fusion.

ELE E 582 Advanced Plasma Physics (also A&EP 607)
Spring. 4 credits. Prerequisites: ELE E 581 and A&EP 606.
3 lecs.
Boltzmann and Vlasov Equations; dielectric tensor; waves in hot-magnetized plasma; Landau and cyclotron damping; microinstabilities; drift waves, low-frequency stability; test particles, Cerenkov emission; fluctuations; collisional effects; applications.

ELE E 583 Electrodynamics
Fall. 4 credits.
For description see Fields, Waves, and Antennas.

[ELE E 585 Atmospheric and Ionospheric Physics (also Astronomy 575)
Fall. 3 credits. Offered alternate years. Not offered 1992–93.
Energy-balance and thermal structure of neutral atmospheres. Elements of circulation theory. Waves and instabilities. Coupling of lower atmospheres to upper atmospheres. Observations of the terrestrial atmosphere and of the other planets. Physical processes in the earth's ionosphere and magnetosphere. Production, loss, and transport of charged particles. Electric fields. Coupling of neutral-atmosphere dynamics with electric fields and charged-particle transport. Diagnostic techniques, including radar and in situ observations. The equatorial electrojet. Observations of ionospheres on the other planets.]

[ELE E 586 Solar Terrestrial Physics (also Astronomy 576)
Spring. 3 credits. Offered alternate years. Not offered 1992–93.
High-latitude ionosphere; electric fields in the polar cap and auroral zone; particle precipitation and the aurora; magnetic and ionospheric storms; plasma instabilities in the ionosphere and magnetosphere; structure and physical processes in the sun, solar corona, and solar wind; interactions between the solar wind and the earth's magnetosphere; trapping, acceleration, and drift of energetic particles in the magnetosphere.]

ELE E 588 Electromagnetic Wave Propagation II
Spring. 3 credits. Prerequisites: ELE E 487 and 581, or permission of instructor. Offered alternate years.
3 lecs.
For description see Fields, Waves, and Antennas.

ELE E 589 Magnetohydrodynamics
3 credits. Prerequisite: ELE E 581. Offered upon sufficient demand.
The theory of ideal and nonideal magnetohydrodynamical equations with emphasis on application to controlled thermonuclear fusion. Topics: derivation and domain of applicability; invariants; waves, equilibrium and normal-mode stability analysis; continuous spectrum; energy principle and applications to confinement geometries; nonideal effects, resistivity, finite Larmor radius stabilization. Selected additional topics such as dynamo theory or MHD turbulence.

ELE E 681 Kinetic Theory (also A&EP 761)
Fall. 3 credits. Prerequisite: ELE E 407, Physics 561, or permission of instructor.
3 lecs.
Classical, quantum, and relativistic kinetic theory, Liouville equation, Prigogine and Bogoliubov analysis of the BBKGY sequence. Master equation, density matrix, Wigner distribution. Derivation of fluid dynamics. Transport coefficients. Boltzmann, Krook, Fokker-Planck, Landau, and Balescu-Lenard equations. Properties and theory of the linear Boltzmann collision operator. The relativistic Maxwellian. At the level of *Introduction to the Theory of Kinetic Equations*, by Liboff.

ELE E 682 Nonlinear Phenomena in Plasma Physics
Fall. 3 credits. Prerequisite: ELE E 582. Offered alternate years.
Single-particle motion, multiple-time-scale analysis and ponderomotive effects, weakly nonlinear waves and solitons, nonlinear Vlasov phenomena, quasilinear theory, resonance broadening and resonant mode-mode coupling, statistical theories of plasma turbulence, recent developments in stochasticity and chaos in plasma physics.

[ELE E 685 Solar Plasma Physics
Fall. 3 credits. Offered upon demand. Not offered 1992–93.
This course will be coordinated with the two courses on upper atmospheric physics, ELE E 585 and 586, to provide an integrated view of solar-terrestrial physics for the graduate student intending a research career in space plasma physics. A thorough understanding of electromagnetic theory and some knowledge of fluid mechanics and plasma physics at the level of ELE E 581 and 582 are assumed.]

Fields, Waves, and Antennas

ELE E 303–304 Electromagnetic Fields and Waves
303, fall; 304, spring. 4 credits each semester. For description see Core Courses.

ELE E 316 High-Frequency and Microwave Fundamentals
Spring. 4 credits. Prerequisites: ELE E 301, 303, and 315.
3 lecs, 1 lab.
Laboratory and design studies in high-frequency and fast-pulse circuits, microwaves and electro-optics. Technical report writing. Eight experiments and two design projects.

ELE E 433 Microwave Integrated Circuits
Fall. 4 credits; may be taken for 3 credits without laboratory. Prerequisites: ELE E 303 and ELE E 306.
For description see Solid-State Electronics.

ELE E 487 Introduction to Antennas and Radar
Fall. 3 credits. Prerequisites: ELE E 301 and ELE E 304 (or at least a grade of B in ELE E 303).
Fundamentals of antenna theory, including gain and effective area, near and far fields, phased arrays, aperture antennas and aperture synthesis. Fundamentals of radar, including detection, tracking, Doppler shifts, sampling, range and frequency aliasing. Pulse compression principles and the ambiguity function; synthetic aperture radars and remote sensing from aircraft and satellites; over-the-horizon (OTH) radars and ionospheric propagation effects; radar astronomy techniques, including range-Doppler mapping of planets and the problem of overspread targets.

ELE E 534 Microwave Semiconductor Devices
Spring. 4 credits. Prerequisites: ELE E 433 and 457.
3 lecs, 1 lab. For description see Solid-State Electronics.

ELE E 583 Electrodynamics
Fall. 4 credits. Prerequisite: ELE E 301 and ELE E 304 or equivalent.
3 lecs.
Maxwell's equations, electromagnetic potentials, integral representations of the electromagnetic field, Green's functions. Special theory of relativity, Lienard-Wiechert potentials, radiation from accelerated charges, Cerenkov radiation. Electrodynamics of dispersive dielectric and magnetic media. At the level of *Classical Electrodynamics*, by Jackson.

ELE E 584 Microwave Theory
Spring. 4 credits. Prerequisites: ELE E 301 and 304 or equivalent.
3 lecs, 1 rec.
Theory of passive microwave devices. Modal analysis of inhomogeneous waveguides and cavities. Waveguide excitation, perturbation theory. Nonreciprocal waveguide devices. Scattering matrix analysis of multiport junctions, resonant cavities, directional couplers, circulators. Periodic waveguides, coupled-mode theory.

ELE E 588 Advanced Electromagnetic Wave Propagation and Scattering
Spring. 3 credits. Prerequisite: ELE E 487 and 581 or permission of instructor. Offered alternate years.
3 lecs.
Full-wave solutions of the wave equations, interactions between particles and waves, scattering of radio waves from random fluctuations in refractive index, scatter propagation, incoherent scatter from the ionosphere and its use as a diagnostic tool, scattering from unstable plasma waves, pulse compression and other radar probing techniques.

General

ELE E 250 Technology in Western Society (also ENGRG 250)
Fall. 3 credits. Approved for humanities distribution.
For description see Engineering Common Courses.

ELE E 292 The Electrical and Electronic Revolutions (also ENGRG 292)
Spring. 3 credits.
For description see Engineering Common Courses.

ELE E 360 Ethical Issues in Engineering
Spring. 3 credits. A social science elective for engineering students. Open to juniors and seniors.
3 lecs.
For description see Engineering Common Courses.

ELE E 480 Thermal, Fluid, and Statistical Physics for Engineers
Spring. 3 credits. Prerequisite: Physics 214.
Extensive review of thermodynamic principles. Elementary theory of transport coefficients. Elements of fluid dynamics. Shock waves. Central-limit theorem. Random walk. Electrical noise. Fluctuation-dissipation theorem. Quantum and classical statistics. Black-body radiation. Thermal properties of solids. Kramers-Kronig relation. Elementary descriptions of the p-n junction. Shockley equation, superfluidity, superconductivity, and the laser.

ELE E 491–492 Electrical Engineering Project
491, fall; 492, spring. 1–8 credits.
Individual study, analysis, and, usually, experimental tests in connection with a special engineering problem chosen by the student after consultation with the faculty member directing the project. An engineering report on the project is required.

ELE E 495–496 Special Topics in Electrical Engineering
1–4 credits.
Seminar, reading course, or other special arrangement agreed on by the students and faculty members concerned.

ELE E 515–516 Applied Signal Processing Systems Design
515, fall; 516, spring. Variable credits.
Project-level design of systems in the area of signal processing and general instrumentation, including digital signal processing hardware, audio, speech, and analog interfacing. Students pursue individual projects and coordinate ideas and resources with other students with related interest.

ELE E 517–518 Large-scale, Interdisciplinary, System-Design Concepts: A Practical Electric Vehicle
517, fall; 518, spring. Variable credits.
1 lec, 1 rec.
Engineering-system design and analysis related to the basic electrical- and mechanical-engineering systems in electric vehicle technology, with consideration of economic and manufacturing factors. Emphasis on open-ended design, design evaluation, and effective oral and written communication. Independent assignments within specialized design teams in these areas: motor and drive systems, microprocessor-control systems, optical communications systems, regenerative braking systems, data acquisition instrumentation, display systems, active noise abatement, power electronics, and energy-systems management. Analog and digital circuit design, system-level simulation techniques, microprocessor-system design, DSP and signal-conditioning techniques, feedback-control techniques, solid-state electronic devices, optical communications devices, and transducer applications, as well as data-acquisition-system design.

ELE E 591–599 Graduate Topics in Electrical Engineering
1–4 credits.
Seminar, reading course, or other special arrangement agreed on by the students and faculty members concerned.

ELE E 691–692 Electrical Engineering Colloquium
691, fall; 692, spring. 1 credit each term. For students enrolled in the graduate Field of Electrical Engineering.
Lectures by staff, graduate students, and visiting authorities. A weekly meeting for the presentation and discussion of important current topics in the field. Report required.

ELE E 693–694 Master of Engineering Design
693, fall; 694, spring. 1–10 credits. For students enrolled in the M.Eng.(Electrical) degree program. Uses real engineering situations to present fundamentals of engineering design. Each professor is assigned a section number. To register, see roster for appropriate numbers.

ELE E 695–699 Graduate Topics in Electrical Engineering
1–6 credits.
Seminar, reading course, or other special arrangement agreed on by the students and faculty members concerned.

ELE E 791–792 Thesis Research
791, fall; 792, spring. 1–15 credits. For students enrolled in the master's or doctoral program.

GEOLOGICAL SCIENCES

Freshman and Sophomore Courses

GEOL 101 Introductory Geological Sciences
Fall, spring. 3 credits.
2 lecs, 1 lab, field trips, evening exams in the fall term. Fall, W. B. Travers; spring, J. M. Bird.
Observing and understanding the earth, including oceans, continents, coasts, rivers, ice ages, earthquakes, volcanoes, and mountains; theories of plate tectonics; origin, discovery, and development of mineral and water resources. Use of topographic and geologic maps, recognition of minerals and rocks, and field trips to Cascadilla Gorge, Fall Creek, and Enfield Glen.

GEOL 102 Evolution of the Earth and Life
Spring. 3 credits. Prerequisite: GEOL 101 recommended.
2 lecs, 1 lab, field trips, weekly quizzes, no midterm. J. L. Cisne.
The earth and life in terms of evolutionary processes and global energy and material. The planet as a by-product of stellar evolution. Plate tectonics, continental drift; implications for life, fossil fuels, and climate. Geologic history of the greenhouse effect. Human ancestry, dinosaurs, rocks, and fossils that tell the story. Field trips and fossil-collecting.

GEOL 103 Introductory Geology in the Field
Fall. 3 credits. Limited to 35 students.
1 lec, 1 field trip or lab, 1 rec.
A. L. Bloom.
Subject matter of GEOL 101, taught as much as possible by field trips on campus and in the vicinity, on foot and by bus. Weekly field trips until November introduce most of the major topics of the course, supplemented by lectures, recitations, and labs later in the term.

GEOL 104 The Sea: An Introduction to Oceanography (also Biological Sciences 154)
Spring. 3 credits.
Two 1-hr lecs., one 2 1/2-hr lab.
W. M. White, C. Greene.
A survey of the physics, chemistry, geology, and biology of the oceans for both science and non-science majors. Topics include: seafloor spreading and plate tectonics, marine sedimentation, chemistry of seawater, ocean currents and circulation, the oceans and climate, ocean ecology, coastal processes, marine pollution and waste disposal, and marine resources.

GEOL 107 Frontiers of Geology I
Fall. 1 credit. May be taken concurrently with or after GEOL 101, 102, 103, 104, 111, 201, or 202.
1 lec. J. L. Cisne and staff.
Get beyond the textbooks and standard introductory courses. What are some of today's big geological research questions, and how are they being answered? An opportunity for students in 100- or 200-level courses to get exposure to the subject from a different Cornell researcher every week. Lectures are geared to the fall introductory geology courses.

GEOL 108 Frontiers of Geology II
Spring. 1 credit. May be taken concurrently with or after GEOL 101, 102, 103, 104, 111, 201, or 202.
1 lec. J. L.Cisne and staff.
Like GEOL 107, but geared to the spring introductory geology courses.

GEOL 111 To Know the Earth
Fall. 3 credits.
2 lecs, 1 lab, and field trips. J. E. Oliver.
Acquaints the non-scientists with the earth. Geology as an intellectual challenge, a provider of resources, an environment, a danger, a base for culture, and a science among sciences. Landscapes, mountains, earthquakes, volcanoes, oceans, gold, petroleum, and icecaps. Record of the past, context of the present, forecast for the future.

GEOL 201 Introduction to the Physics and Chemistry of the Earth (also ENGRD 201)
Spring. 3 credits. Prerequisites: Mathematics 191, Physics 112, and Chemistry 207.
2 lecs; 1 rec, lab, or field trip.
L. M. Cathles.
For description see Engineering Common Courses.

GEOL 202 Environmental Geology
Spring. 3 credits.
2 lecs; 1 rec, lab, or field trip. D. E. Karig and A. L. Bloom.
Geologic processes that affect or are affected by human society, including stream behavior and floods, earthquakes, land stability and mass-wasting, and volcanic hazards. Applications of geology to engineering, natural resources, and land-use planning. Local examples discussed and visited on short field trips. May be taken as an introduction to geology, or as a continuation of GEOL 101 or 103.

GEOL 204 Hydrology and the Environment (also SCAS 371, CEE 334, and ABEN 371)
Spring. 3 credits. Prerequisite: 1 course in calculus.
2 lecs., 1 lab. P. C. Baveye, W. H. Brutsaert, L. M. Cathles, J. -Y. Parlange, T. S. Steenhuis, M. F. Walter.
Introduction to hydrology: the hydrologic cycle and the role of water and chemicals in the natural environment. Includes precipitation, infiltration, evapotranspiration, groundwater, surface runoff, river meandering floods, and droughts. Case studies, short field trips, computer programs, and laboratories foster an understanding of concepts and principles of hydrologic processes.

GEOL 210 Introduction to Field Methods in Geological Sciences
Fall. 2 credits. Prerequisite: GEOL 101 or coregistration. Weekly field sessions.
A weekend field trip.
D. E. Karig.
The methods by which rocks are used as a geological database. Field methods used in the construction of geologic maps and cross sections; systematic description of stratigraphic sections. Field and laboratory sessions on Saturday mornings until Thanksgiving. One additional lecture during most of these weeks. One weekend field trip to eastern New York.

GEOL 212 Special January Field Trip
Fall. 1 credit. Prerequisites: GEOL 101 or 201 or equivalent, and permission of instructor. Travel and subsistence expenses to be announced.
1 lec, field trip. Staff.
A trip of one week to ten days during January intersession in an area of interesting geology in the lower latitudes. Interested students should contact the instructor during the early part of the fall semester.

GEOL 213 Marine and Coastal Geology
Summer. 2 credits. Prerequisites: an introductory course in geology or permission of instructor.
A special one-week course offered at Cornell's Shoals Marine Laboratory (SML), on an island near Portsmouth, New Hampshire. For more details and an application, consult the SML office, G14 Stimson Hall. Estimated cost (including tuition, room, board, and ferry transportation) is $600.

GEOL 214 Western Adirondack Field Course
Spring, one week at the end of the semester. 1 credit. Prerequisite: GEOL 101 or 102 or equivalent. Students should be prepared for overnight camping and share in the cost of camp meals.
W. A. Bassett.
Field mapping methods, mineral and rock identification, examination of Precambrian metamorphic rocks and lower Paleozoic sediments, talc and zinc mines.

Junior, Senior, and Graduate Courses

Of the following, the core courses GEOL 326, 355, 356, 375, and 388 may be taken by those who have successfully completed GEOL 201 or the equivalent or who can demonstrate to the instructor that they have adequate preparation in mathematics, physics, chemistry, biology, or engineering.

GEOL 326 Structural Geology
Spring. 4 credits. Prerequisite: GEOL 101 or 201, or permission of instructor.
3 lecs, 1 lab, field trips.
R. W. Allmendinger.
Nature and origin of deformed rocks at microscopic to macroscopic scales, with emphasis on structural geometry and kinematics.

GEOL 355 Mineralogy
Fall. 4 credits. Prerequisite: GEOL 101 or 201 and Chem 207 or permission of instructor.
1 lec, 1 lab; assigned problems and readings. W. A. Bassett.
Examination of minerals by hand-specimen properties and optical microscopy. Geological setting, classification, crystal structures, phase relations, chemical properties, and physical properties of minerals are studied. X-ray diffraction is introduced. Independent research project.

GEOL 356 Petrology and Geochemistry
Spring. 4 credits. Prerequisite: GEOL 355.
2 lecs, 2 labs, 1 field trip; assigned problems and readings. R. W. Kay.
Principles of phase equilibrium as applied to igneous and metamorphic systems. Description, classification, chemistry, origin, regional distribution, and dating of igneous and metamorphic rocks. Geochemical distribution of trace elements and isotopes in igneous and metamorphic systems. The petrological evolution of the planets.

GEOL 375 Sedimentology and Stratigraphy
Fall. 4 credits. Recommended: GEOL 102 or 201.
3 lecs, 1 lab, field trips. J. L. Cisne, T. E. Jordan.
Formation of sedimentary rocks. Depositional processes. Depositional environments and their recognition in the stratigraphic record. Correlation of strata in relation to time and environment. Seismic stratigraphy. Geological age determination. Reconstruction of paleogeography and interpretation of earth history from stratigraphic evidence.

GEOL 388 Geophysics and Geotectonics
Spring. 4 credits. Prerequisites: Mathematics 192 and Physics 208, 213, or equivalent.
3 lecs, 1 lab. B. L. Isacks.
Global tectonics and the deep structure of the solid earth as revealed by investigations of earthquakes, earthquake waves, the earth's gravitational and magnetic fields, and heat flow.

GEOL 410 Field Geology
Summer. 4 credits. Prerequisites: GEOL 210, 214, and 326, or permission of instructor.
Four weeks at research sites in the western United States or Canada. Fee, approximately $1,300.
Staff.
Field mapping techniques in igneous, metamorphic, and sedimentary rock, using topographic maps and air photos. The structural geology, petrology, geomorphology, and sedimentology of selected areas in the Rocky Mountains will be included. An independent project and report is done during the last week.

[GEOL 424 Petroleum Geology
Fall. 3 credits. Recommended: GEOL 326. Offered alternate years. Not offered 1992–93.
2 lecs, 1 lab. W. B. Travers.
Introduction to hydrocarbon exploration and development. Exploration techniques, including well logs, fluid pressures, seismic-reflection methods, gravity, and magnetic measurements to map subsurface structures and stratigraphy. Petroleum origin and migration. Dispersal systems and depositional patterns of petroleum reservoirs. Economics of exploration, leasing, drilling and production. Estimates of petroleum reserves, including tar sands and oil shales.]

GEOL 432 Digital Processing and Analysis of Geophysical Data
Spring. 3 credits. Prerequisite: GEOL 487 or equivalent.
3 lecs. L. D. Brown.
Sampling theory. Fourier, Laplace, and Z-transform techniques. Spectral analysis. Temporal and spatial filtering. Seismic processing theory: signal enhancement and imaging.

GEOL 433 Exploration Seismology I: Data Acquisition and Processing
Fall. 3 credits. Prerequisite or corequisite: GEOL 487 or equivalent. Offered alternate years.
3 lecs. L. D. Brown.
Planning seismic reflection and refraction surveys. Array design. Source characteristics and ground coupling. Land and marine operations. 2-D and 3-D surveys. Convolutional seismic model. Applied seismic processing: FK filtering, deconvolution, velocity analysis, stacking, migration, display. True amplitude processing.

[GEOL 434 Exploration Seismology II: Analysis and Interpretation
Spring. 3 credits. Prerequisite: GEOL 487 or equivalent. Offered alternate years. Not offered 1992–93.
3 lecs. L. D. Brown.
Techniques for inferring geologic structure and lithology from multichannel seismic reflection data and crustal refraction data. Migration. Velocity and amplitude interpretation, correlation criteria, resolution wave-form analysis, seismic structure, and stratigraphy. Seismic modeling. 3-D and VSP. Attribute and tau-p analysis.]

[GEOL 437 Geophysical Prospecting
Fall. 3 credits. Prerequisites: Physics 213 and Mathematics 192 or equivalents, or permission of instructor. Offered alternate years. Not offered 1992–93.
3 lecs. L. D. Brown.
Physical principles, instrumentation, operational procedures, and interpretational techniques for imaging the subsurface with seismic, gravity, and electromagnetic (radar, MT, electric sounding) techniques. Oil and gas prospecting, geohydrology, civil data engineering, soil-science, and archeology applications. Field-data acquisition and subsequent processing and interpretation using computer-graphics workstations.]

GEOL 441 Geomorphology
Fall. 3 credits. Prerequisite: GEOL 102 or 201, or permission of instructor.
2 lecs, 1 lab. A. L. Bloom.
Systematic analysis of landforms constructed by tectonic and volcanic processes and their subsequent progressive destruction by climate-controlled erosional processes.

[GEOL 442 Glacial and Quaternary Geology
Spring. 3 credits. Prerequisite: GEOL 441 or permission of instructor. Offered alternate years. Not offered 1992–93.
2 lecs, 1 lab; several field trips.
A. L. Bloom.
Glacial processes and deposits and the chronology of the Quaternary Period.]

GEOL 445 Geohydrology (also ABEN 471 and C&EE 431)
Fall. 3 credits. Prerequisites: Mathematics 294 and Engr 202.
3 lecs. A. L. Bloom, W. Brutsaert, L. M. Cathles, J. -Y. Parlange, T. S. Steenhuis.
Intermediate-level study of aquifer geology, groundwater flow, and related design factors. Includes description and properties of natural aquifers, groundwater hydraulics, soil water, and solute transport.

[GEOL 452 X-ray Diffraction Techniques
Spring. 3 credits. Prerequisites: GEOL 355 or permission of instructor. Offered alternate years. Not offered 1992–93.
1 lec, 2 labs. W. A. Bassett and staff.
Automated X-ray diffractometer, Debye-Scherrer, real-time Laue, high-temperature diffraction, high-pressure diffraction, and pole-figure analysis. Applications in materials science and geological sciences. Labs will be held in the new Materials Science X-Ray Facility.]

GEOL 453 Modern Petrology
Fall. 3 credits. Prerequisite: GEOL 356. Offered alternate years.
2–1/2 lecs, 1/2 lab. R. W. Kay.
Magmas and metamorphism in the context of plate tectonics. Major and trace element chemistry and phase petrology as monitors of the creation and modification of igneous rocks. Temperature and stress in the crust and mantle and their influence on reaction rates and textures of metamorphic rocks. Application of experimental studies to natural systems.

GEOL 454 Advanced Mineralogy
Spring. 3 credits. Prerequisite: GEOL 355 or permission of instructor. Offered alternate years.
2 lecs, 1 lab. W. A. Bassett.
Crystallography and crystal chemistry of minerals and the methods of their study. X-ray diffraction, optical methods, computer simulation of crystal structures. Emphasis on effects of high pressures and temperatures with implications for understanding of Earth's interior.

GEOL 455 Geochemistry
Fall. 4 credits. Prerequisites: Chemistry 207 or equivalent, Mathematics 192. Recommended: GEOL 356. Offered alternate years.
3 lecs, 1 disc. W. M. White.
The Earth from a chemical perspective. Formation of the elements; cosmochemistry; chemical evidence regarding the formation of the Earth and Solar System; trace-element geochemistry; isotope geochemistry; geochemical thermodynamics and kinetics; chemical evolution of the crust, mantle, and core; weathering and the chemistry of natural waters; chemistry of the oceans; hydrothermal systems and ore deposition.

[GEOL 458 Volcanology
Spring. 3 credits. Corequisite: GEOL 356 or equivalent. Offered alternate years. Not offered 1992–93.
2 lecs., 1 lab/rec, possible spring-break field trip to volcanic area such as Hawaii.
R. W. Kay, W. M. White.
Causes of volcanism, melting in the Earth and the origin of magmas. Physical volcanology, nature and types of volcanic eruptions and associated deposits, eruption mechanisms. Volcanic plumbing systems, magma chamber processes, evolution of magma. Volcanism and impact phenomena in the Solar System. Volcanic hazard assessment and volcano monitoring. Ore deposits associated with volcanism.]

[GEOL 476 Sedimentary Basins: Tectonics and Mechanics
Spring. 3 credits. Prerequisite: GEOL 375 or permission of instructor. Offered alternate years. Not offered 1992–93.
3 lecs. T. E. Jordan.
Subsidence of sedimentary basins from the point of view of plate tectonics and geomechanics. Interactions of subsidence, sediment supply, and environmental characteristics in development of stratigraphic sequences. Framework of active-margin, passive-margin, and cratonic basins; and stratigraphy. Geophysical and stratigraphic modeling; sequence stratigraphy. Modern and ancient examples.]

GEOL 478 Advanced Stratigraphy
Spring. 3 credits. Prerequisite: GEOL 375 or permission of instructor. Offered alternate years.
2 lecs, 1 lab, possible spring break field trip. T. E. Jordan.
Modern improvements on traditional methods of study of ages and of genetic relations among sedimentary rocks, emphasizing 3-D relationships. Techniques and applications of

sequence stratigraphy at scales ranging from beds to entire basins. Physical correlation, dating techniques, and time resolution in sedimentary rocks. Physical controls on the stratigraphic record and numerical modeling.

GEOL 479 Paleobiology (also Bio Sci 479)
Fall. 3 credits. Prerequisites: Biological Sciences 101–102 and 103–104 or equivalent, and either GEOL 375, Biological Sciences 272–274, Biological Sciences 373, or permission of instructor. Offered alternate years.
3 lecs. J. L. Cisne and staff.
The major groups of organisms and their evolutionary histories. Intended to fill out the biological backgrounds of geology students and the geological backgrounds of biology students concerning the nature and significance of the fossil record.

GEOL 481 Senior Survey of Earth Systems
Fall. 3 credits. Limited to seniors majoring in geological sciences.
1 lec, 1 disc. J. M. Bird.
Survey course that integrates undergraduate course work, intended to enhance overall understanding of geological sciences. Emphasis on current models of earth's dynamic systems (e.g., global climate change; mantle evolution). Guest lecturers; synthesis and review literature; *Scientific American* readings; discussions; student presentations.

GEOL 489 Earthquakes and Tectonics
Fall. 3 credits. Prerequisites: GEOL 101 or 201, Physics 213, or permission of instructor. Offered alternate years.
3 lecs. B. L. Isacks.
The mechanisms of earthquakes revealed by seismic-wave radiation and by near-source studies of faulting and surface deformation; relationships to regional tectonics; earthquake hazard and prediction.

GEOL 490 Honors Thesis (B.A. degree candidates)
Fall, spring. 2 credits.
Staff.
Thesis proposal to be discussed with director of undergraduate studies during the junior year. Participation requires acceptance of a thesis proposal by the faculty committee.

GEOL 491–492 Undergraduate Research
Fall, spring. 1 credit.
Staff (D. E. Karig and A. L. Bloom, coordinators).
Introduction to the techniques and philosophy of research in the earth sciences and an opportunity for undergraduates to participate in current staff research projects. Topics chosen in consultation with, and guided by, a staff member. A short written report is required, and outstanding projects are prepared for publication.

GEOL 500 Design Project in Geohydrology
Fall, spring 3–12 credits. An alternative to an industrial project for M.Eng. students choosing the geohydrology option. May continue over two or more semesters.
L. M. Cathles.
The project may address one of many aspects of groundwater flow and contamination, and must involve a significant geological component and lead to concrete recommendations or conclusions of an engineering nature. Results are presented in GS 501, Geohydrology Design Project Seminar.

GEOL 501 Geohydrology Design Project Seminar
Fall, spring. 1 credit. Required for the M.Eng. degree, geohydrology option.
1 rec., hours to be arranged.
L. M. Cathles.
In fall, the weekly seminar provides a forum for discussion of courses and development of design projects (see GS 500). In spring, it provides an opportunity to present and discuss design projects.

GEOL 502 Case Histories in Groundwater Analysis
Spring. 4 credits.
L. M. Cathles, A. L. Bloom.
Groundwater flow in a specific area, such as a proposed nuclear-waste disposal site, analyzed in depth. Geological and resource data on the area are presented early in the course. Then the material is analyzed by students working as an engineering analysis team. Each student makes a weekly progress report and writes part of a final report. Results are presented in a half-day seminar at end of term.

[GEOL 621 Marine Tectonics
Fall. 3 credits. Prerequisites: GEOL 326 and a course in geophysics. Offered alternate years. Not offered 1992–93.
3 lecs. D. E. Karig.
Study of geophysical and geological characteristics of the earth's crust beneath the oceans. Emphasis on recent geologic data concerning plate margins in the oceans; island-arc systems, spreading systems, and transforms. Techniques for determining instantaneous and finite plate rotations. Lectures and reviews of recent papers. Term project and paper required.]

GEOL 622 Advanced Structural Geology I
Spring. 3 credits. Prerequisites: GEOL 326 and permission of instructor. Offered alternate years.
2 lecs, 1 lab, possible weekend field trips.
D. E. Karig, R. W. Allmendinger.
Stress-strain theory and application. Advanced techniques of structural analysis. Topics include finite and incremental strain measurement; microstructure, preferred orientation, and TEM analysis; pressure solution and cleavage development; and experimental deformation. Applications to deformation of unconsolidated sediments, brittle and brittle-ductile deformation of supracrustal strata, and ductile deformation of high-grade metamorphic rocks. Kinematic analysis of shear zones and folds in these regimes.

[GEOL 624 Advanced Structural Geology II
Spring. 3 credits. Prerequisites: GEOL 326 and permission of instructor. Offered alternate years. Not offered 1992–93.
2 lecs, 1 lab, spring-recess trip.
R. W. Allmendinger, D. E. Karig.
Geometry, kinematics, and mechanics of structural provinces. Concentration on thrust belts, rift provinces, or strike-slip provinces. Techniques of balanced cross sections.]

GEOL 625 Tectonic History of Western North America from Craton to Terranes
Fall. 2 credits. Open to seniors and graduate students. Offered alternate years.
Lecture, term paper, quizzes, no final.
W. B. Travers.
Seminar on current research on the sequence, style, and mechanics of deformation, with emphasis on growth of the continent in the western United States and southern Canada.

GEOL 628 Geology of Orogenic Belts
Spring. 4 credits. Prerequisite: permission of instructor.
T R 10:10–12:05. J. M. Bird.
A seminar course in which students study specific geologic topics of an orogenic belt selected for study during the term. The course is intended to complement GEOL 681.

GEOL 635 Advanced Geophysics I: Quantitative Geodynamics
Spring. 3 credits. Prerequisite: GEOL 388.
3 lecs. D. L. Turcotte.
Stress and strain, elasticity and flexure, heat transfer, gravity, fluid mechanics, rock rheology, faulting, and flow in porous media.

[GEOL 637 Advanced Geophysics II: Fundamentals of Mantle Convection
Spring. 3 credits. Prerequisite: GEOL 388. Not offered 1992–93.
3 lecs. D. L. Turcotte.
Geological and geophysical evidence, structure of the mantle, material properties, heat sources, basic equations, linear stability, approximate solution, numerical solutions, plumes, laboratory experiments, chemical geodynamics, convection in the terrestrial planets.]

GEOL 656 Isotope Geochemistry
Srping. 3 credits. Open to undergraduates. Prerequisite: GEOL 356 or permission of instructor. Offered alternate years.
3 lecs. W. M. White.
Nucleosynthetic processes and the isotopic abundances of the elements. Geochronology and cosmochronology using radioactive decay schemes, including U-Pb, Rb-Sr, Sm-Nd, K-Ar, U-series isotopes, and cosmogenic isotopes such as ^{14}C and ^{36}Cl. Use of radiogenic and stable isotopes in petrology and their application to study of the evolution of the crust and mantle. Isotopic evidence regarding the formation of the Earth and the Solar System. Stable isotopes and their use in geothermometry, ore petrogenesis, paleontology, and the global climate system.

GEOL 681 Geotectonics
Fall. 4 credits. Prerequisite: permission of instructor.
2 lecs. J. M. Bird.
Theories of orogeny; ocean and continent evolution. Kinematics of lithosphere plates. Rock-time assemblages of modern oceans and continental margins, and analogs in ancient orogenic belts. Time-space reconstructions of specific regions. Problems of dynamic mechanisms—corollaries and evidence from crustal features.

GEOL 687 Seismology
Fall. 3 credits. Prerequisite: T&AM 611 or equivalent. Offered alternate years.
3 lec-recs. B. L. Isacks.
Generation and propagation of elastic waves in the earth. Derivation of the structure of the earth and the mechanism of earthquakes from seismological observations.

GEOL 695 Computer Methods in Geological Sciences
L. D. Brown, B. L. Isacks.
To familiarize students with the growing importance of computers in geological and geophysical research. Develop, debug, implement, and document a program relevant

to current research. Facilities include the department's VAX workstations, MEGASEIS seismic computer, Landmark Interpretation Workstation, IIS image processor, and numerous graphics and I/O peripherals. The Cornell National Supercomputer Facility may also be used.

GEOL 700–799 Seminars and Special Work
Fall, spring. 1–3 credits. Prerequisite: permission of instructor.
Advanced work on original investigations in geological sciences. Topics change from term to term.

GEOL 722 Advanced Topics in Structural Geology
R. W. Allmendinger.

GEOL 725 Rock and Sediment Deformation
D. E. Karig.

GEOL 731 Plate Tectonics and Geology
J. M. Bird.

GEOL 741 Advanced Geomorphology Topics
A. L. Bloom.

GEOL 751 Petrology and Geochemistry
R. W. Kay.

GEOL 753 Advanced Topics in Mineral Physics
W. A. Bassett.

GEOL 755 Advanced Topics in Petrology and Tectonics
J. M. Bird, W. A. Bassett.

GEOL 757 Current Research in Petrology
R. W. Kay.

GEOL 762 Advanced Topics in Petroleum Exploration
W. B. Travers.

GEOL 771 Advanced Topics in Sedimentology and Stratigraphy
T. E. Jordan.

GEOL 773 Paleobiology
J. L. Cisne.

GEOL 780 Seismic Record Reading
M. Barazangi, B. L. Isacks.

GEOL 781 Geophysics, Exploration Seismology
L. D. Brown.

GEOL 783 Advanced Topics in Geophysics
B. L. Isacks.

GEOL 788 Geophysics, Seismology, and Geotectonics
J. E. Oliver.

GEOL 789 Research on Seismic-Reflection Profiling of the Continental Crust
J. E. Oliver, L. D. Brown.

GEOL 793 Andes Seminar
B. L. Isacks, T. E. Jordan, A. L. Bloom, R. W. Allmendinger.

GEOL 796 Geochemistry of the Solid Earth
Fall.
W. M. White.

GEOL 797 Fluid-Rock Interactions
L. M. Cathles.

GEOL 799 Contemporary Issues in Groundwater Hydrology
Spring.
L. M. Cathles.

MATERIALS SCIENCE AND ENGINEERING

Undergraduate Courses

MS&E 111 Elements of Materials Science and Engineering (also ENGRG 111)
Fall. 3 credits.
3 lecs.
Introduces different classes of materials and demonstrates how differences in the atomic structure and bonding can lead to widely different properties and performance. Whether we analyze the materials in an automobile, a walkman, a computer, or a tennis racket, we find only four general classes of materials with distinct characteristics: metals, ceramics, polymers, and semiconductors.

MS&E 261 Introduction to Mechanical Properties of Materials (also ENGRD 261)
Fall, spring. 3 credits. Prerequisite: coregistration in Physics 213 or electricity and magnetism in high school physics.
2 lecs, 1 rec or lab.
For description see Engineering Common Courses.

MS&E 262 Introduction to Electrical Properties of Materials (also ENGRD 262)
Spring. 3 credits. Prerequisite: co-registration in Physics 213 or electricity and magnetism in high school physics.
2 lecs, 1 rec or lab.
For description see Engineering Common Courses.

[MS&E 285 Art, Isotopes, and Analysis (also Engr 185, Physics 200, Archaeology 285, English 285, and Art 372)
Spring. 3 credits. Not offered 1992–93.
3 lecs. S. Taft, D. Eddy.
For description see Engineering Common Courses.]

[MS&E 286 The Science of Art and Books
Fall. 3 credits. Prerequisites: MS&E 285, Engl 285, Phys 200, Engr 185, or Archaeo 285. Not offered 1992–93.
3 lecs. D. Eddy.
Sculptures, ceramics, and rare books (bindings, paper, and production) from the viewpoint of their construction, chronology, and conservation. Lectures and laboratory demonstrations will show the applications of x-rays, beta rays, and neutrons in analysis of works of art. Archaeological aspects—dendrochronology and carbon-14 dating—will also be covered.]

MS&E 331/531 Structure of Materials
Fall. 4 credits.
3 lecs, 1 lab.
Crystal structures and crystal defects, stereographic projection methods. Techniques for materials analysis: X-ray and electron diffraction, optical and electron microscopy. Design of experimental systems for the structural characterization of materials.

MS&E 332/532 Electrical and Magnetic Properties of Materials
Spring. 3 credits. Prerequisite: MS&E 331 or permission of instructor.
3 lecs.
Introduction to electronic band structure of crystals. Electrical and magnetic properties of metals and semiconductors as affected by microstructure. Design of semiconductor properties by doping. Carrier drift, diffusion, and recombination. Properties of heterojunctions in semiconductor devices. Principles and design of ferromagnetic materials for transformers, permanent magnets, and magnetic memory devices. Fundamentals of superconducting materials for high-field magnets and Josephson junctions.

MS&E 333 Research Involvement I
Fall. 3 credits. Prerequisite: approval of department.
Supervised independent research project in association with faculty member and faculty research group of the department. Students design experiments, set up the necessary equipment, and evaluate the results. Creativity and synthesis are emphasized. Typical projects have involved hot isostatic compaction, sputter etching, and mechanical testing of polymer films.

MS&E 334 Research Involvement II
Spring. 3 credits. Prerequisite: approval of department.
May be a continuation of MS&E 333 or a one-term affiliation with a research group.

MS&E 335/535 Thermodynamics of Condensed Systems
Fall. 4 credits. Prerequisite: Math 293 and 294.
3 lecs.
The three laws of thermodynamics are introduced as a basis for understanding phase equilibria, heterogeneous reactions, solutions, electrochemical processes, surfaces, and defects. Statistical mechanics is introduced and applied to the calculation of entropy and specific heat of ideal gases and solids. One-third of the course involves examples of design and control of materials processing and microstructure.

MS&E 336/536 Kinetics, Diffusion, and Phase Transformations
Spring. 3 credits. Prerequisite: MS&E 335 or permission of instructor.
3 lecs.
Introduction of absolute rate theory, atomic motion, and diffusion. Applications and design involving nucleation and growth of new phases in vapors, liquids, and solids; solidification, crystal growth, oxidation and corrosion, radiation damage, recrystallization, gas-metal reactions, and thermomechanical processing to produce desired microstructures and properties.

MS&E 345 Materials and Manufacturing Processes (also M&AE 312)
Spring. 3 credits. Prerequisite: T&AM 202 or permission of instructor.
2 lecs, 1 lab.
For description see M&AE 312.

MS&E 414/514 Chemical Processing of Ceramics
Spring. 3 credits. No prerequisites.
Design and characterization of materials at the molecular level. Synthesis, drying, and sintering of ceramics, glasses, and composites. Sol-gel, hydrothermal, chemical-vapor

deposition, and pyrolysis techniques. Surface chemistry of oxides. Analytical techniques include chromatography, mass spectrometry, infrared, uv-visible and nuclear-magnetic resonance spectroscopy. Design, synthesis, and chemical properties of inorganic/organometallic precursors. Ceramic thin films, fibers whiskers, and membranes.

MS&E 435 Senior Thesis I & II
435, fall and spring. 2-semester course. 8 credits.
Staff.
Open to advanced undergraduates in lieu of the senior materials laboratory. Proposals for thesis topics should be approved by the supervising faculty member prior to beginning the senior year. Approved thesis topics will normally involve original experimental research in direct collaboration with an ongoing research program. Periodic oral and written presentations and a final written thesis are required.

MS&E 441/541 Microprocessing of Materials
Fall. 3 credits.
3 lecs, occasional lab.
Materials and processing steps involved in the production of integrated circuits and other micro-devices. Science, engineering, and design of processes to produce a specific device, such as a DRAM or CMOS inverter (not detailed electrical-circuit analysis of these devices or system design). Emphasis is on silicon, with mention of gallium arsenide. All fabrication steps are considered, from single crystal growth and wafer production, to characterization, testing and yield calculations. Major topics are thermal oxidation of silicon, chemical vapor deposition of thin films, diffusion, ion implantation, resists and the principles of lithography using UV, electrons and X-rays, and etching both wet and dry.

MS&E 442/542 Macroprocessing (also M&AE 512)
Spring. 3 credits.
3 lecs.
Deformation processing of materials, including superplastic forming, sheet-metal forming, massive forming, and powder processing. Time, temperature, and strain-rate effects in warm-forming and hot-forming. Characterization of powder-compaction mechanisms and their use in process design. Forming-limit diagrams. Development of microstructure-based criteria for fracture in large deformations. Optimization and design of forming processes. Development of constitutive equations for superplastic flow. Design of a superplastic forming process starting from basic mechanisms. The course includes a comprehensive experimental project in which the constitutive equations for superplastic flow are measured and computer-aided techniques are used to design a superplastic forming process. The forming experiment is carried out, and the results are compared with the predictions from the numerical analysis.

MS&E 443–444 Senior Materials Laboratory
443, fall; 444, spring. 3 credits.
Practical laboratory experience covering the analysis and characterization of materials and processing. Emphasis on design of experiments for evaluation of materials' properties and performance as related to processing history and microstructure. Projects available in areas such as plasticity, mechanical and chemical processing, phase transformations, electrical properties, and electron microscopy.

MS&E 445 Mechanical Properties of Materials
Fall. 3 credits. Prerequisites: MS&E 331 and 336, or permission of instructor.
3 lecs.
Stress, strain, and the basics of concepts in deformation and fracture for metals, polymers, and ceramics. Analysis of important mechanical properties such as plastic flow, creep, fatigue, fracture toughness, and rupture. Application of these principles to the design of improved materials and engineering structures.

MS&E 447 Materials Design Concepts I & II
I, fall; II, spring. 4 credits.
Defines design in the field of materials science using Dieter's *Engineering Design*, Ashby's *Materials Selection in Engineering Design*, and other sources. Innovation, patent searching, and ASTMS standards. Speakers from industry and other institutions lecture on case studies of design problems. Students give short oral and written presentations. Proposal for design-study project in the fall semester. Completion of extensive design-study project in the spring semester. Study includes prior art literature, materials selection, and some modeling, as well as discussion of broader economic, regulatory, environmental, and liability concerns that may arise.

MS&E 449 Introduction to Ceramics
Fall. 3 credits. Prerequisite: MS&E 331 or permission of instructor.
3 lecs.
Ceramic processes and products, crystal structures, structure of glasses, point defects (point-defect chemistry and relation to nonstoichiometry), line defects, grain boundaries, diffusion in ionic materials (emphasis on the relationships between diffusion and point-defect structure), phase diagrams, phase transformations, kinetics of solid-state reactions (reactions with and between solids: heterogeneous reactions, reactions between different solids, point-defect relaxation, internal reactions), grain growth and sintering. Physico-chemical aspects are emphasized.

MS&E 450 Physical Metallurgy
Spring. 3 credits.
The service and design requirements of engineering alloys and their testing and characterization. The properties of important alloy systems. The selection and design of alloys for various engineering requirements, such as ASME design codes.

MS&E 452 Properties of Solid Polymers
Spring. 3 credits. Prerequisite: Engr 261 or permission of instructor.
3 lecs.
Synthetic and natural polymers for engineering applications. Production and characterization of long-chain molecules. Gelation and networks, rubber elasticity, elastomers and thermosetting resins. Amorphous and crystalline thermoplastics and their structure. Time- and temperature-dependent elastic properties of polymers. Molecular-weight measurement. Design of high-impact-strength polymers.

MS&E 454 Processing of Glass, Ceramic, and Glass-Ceramic Materials
Spring. 3 credits. Offered alternate years.
Conventional and unconventional techniques for processing glass, glass-ceramic, and ceramic materials. Case studies illustrate the design, engineering, and scientific aspects of such processes. Vapor processes for high-purity optical fibers, hot-processing of ceramic turbine blades, photosensitive materials, and powder processing and sintering of ceramics will be discussed. This course is team taught with two scientists from the research and development laboratory of Corning Glass Works.

MS&E 455 Analysis of Manufacturing Processes (also M&AE 512)
Spring. 3 credits. Prerequisite: M&AE 312.
3 recs.
For description see M&AE 512.

MS&E 459 Physics of Modern Materials Analysis
Fall. 3 credits.
The interaction of ions, electrons, and photons with solids, and the characteristics of the emergent radiation in relation to the structure and composition of materials. Aspects of atomic physics that are relevant to understanding techniques of modern materials analysis. Principles of analysis techniques such as Auger electron spectroscopy, ion scattering, and secondary ion-mass spectroscopy. Design of experiments for near-surface analysis.

MS&E 463 Principles of Electronic Packaging
Spring. 3 credits.
Design, materials, and manufacturing needs for packaging technology, from chip to board. Principles involved in key areas of materials science, and other engineering disciplines. Packaging materials to be discussed include metals, ceramics, and polymers.

Graduate-Level Professional Courses

MS&E 510 Optical Methods and Materials
Spring. 3 credits.
Principles of geometric and Gaussian optics, instrumentation required for optical experiments, and methods in optical spectroscopy. Fundamental aspects of the interaction between optical waves and crystalline solids. Materials aspects of optical devices such as optical films and coatings, light-modulation devices, displays, lasers and detectors, optical waveguides, electro-optic devices, optical recording, and applications of high-intensity light beams.

MS&E 516 Thin-Film Materials Science
Fall. 3 credits.
This course is a fundamental approach to thin-film science that will cover deposition of films, growth of epitaxial layers, formation of multilayered structures such as superlattices and quantum wells, and interdiffusion and reaction in thin films. The course will begin with the structure and thermodynamics of surfaces and ultrathin films. The conditions for epitaxial growth, such as used in semiconductor heterostructures, will be contrasted with those for amorphous or polycrystalline films. The role of thermal processing for reactive thin films involving the formation of surface oxides, metallic silicides, and aluminides will be presented.

MS&E 518 Introduction to Electron Microscopy
Fall. 3 credits. Prerequisite: MS&E 331 or permission of instructor.
3 lecs.
Basic optics and operation of scanning and transmission electron microscopes. Image formation, modes of contrast, and resolution in SEM and TEM. Electron diffraction. Images of perfect crystal and defects in two-beam diffraction contrast. Analytical microscopy; comparison of EDS, WDS, and EELS. Overview of specimen preparation and in-situ microscopy.

MS&E 520 Practical Electron Microscopy
Fall. 3 credits. Corequisite: MS&E 518–520. Limited to 12 students. A fee will be charged for instrument usage.
Lab.
Students will be instructed in the proper use of a scanning and a transmission electron microscope. All stages from initial alignment of the instrument to presentation of the results will be covered. Three or four projects will be completed, including obtaining atomic lattice fringe images and X-ray microanalysis.

MS&E 553–554 Special Project
553, fall; 554, spring. 6 credits each term. Research on a specific problem in the materials area.

Graduate Core Courses

MS&E 601 Thermodynamics of Materials
Fall. 3 credits. Prerequisite: previous course in thermodynamics at level of MS&E 335. Basic statistical thermodynamics. Partition function and thermodynamic state functions. Distributions. Laws of thermodynamics. Free-energy functions and conditions of equilibrium. Chemical reactions. Statistics of electrons in crystals. Heat capacity. Heterogeneous systems and phase transitions. Lattice models of 1–, 2–, 3–dimensional interacting systems. Statistical thermodynamics of alloys. Free-energy and phase diagrams. Order-disorder phenomena. Point defects in crystals. Statistical thermodynamics of interfaces. Nucleation phenomena.

MS&E 602 Elasticity, Plastic Flow, and Fractures
Fall. 3 credits.
Micromechanical modeling of mechanical behavior. A materials-science approach to modeling combines concepts from continuum mechanics, thermodynamics, kinetics and atomic structure. Topics include: elastic properties of crystals, deformation mechanisms from ambient temperature to very high temperatures over a wide range of strain rates, fracture in brittle materials, fracture in ductile materials, fracture at elevated temperatures, crack tip phenomena, and composite materials.

MS&E 603 Analytical Techniques for Materials Science
Fall. 4 credits.
Survey of atomic and structural analysis techniques as applied to surface and bulk materials. Physical processes involved in the interaction of ions, electrons, and photons with solids; characteristics of the emergent radiation in relation to the structure and composition. Techniques covered include Auger electron spectroscopy, ion scattering, nuclear activation, secondary ion mass spectroscopy, UV and X-ray photoelectron spectroscopies, X-ray diffraction and related techniques, etc. Selection and design of experiments for near-surface analysis. At the level of *Physics*, by Tiplar.

MS&E 604 Kinetics of Reactions in Condensed Matter
Spring. 3 credits.
Phenomenology and microscopic aspects of diffusion in fluids (both simple and polymeric) and solids (crystalline and amorphous). Phase transformations including microscopic aspects of nucleation and growth transformations, spinodal decomposition and displacive transformations. Phase-coarsening processes. Kinetics of various interfacial reactions, particularly as applied to thin films. Grain-boundary-migration-controlled kinetics. Recrystallization, grain growth and diffusion-induced grain boundary motion. At the level of *Diffusion in the Condensed State*, by Kirkaldy and Young; and *Introduction to Modern Statistical Mechanics*, by Chandler.

MS&E 605 Structure and Chemistry of Condensed Matter
Spring. 3 credits.
This course focuses on the link between the local chemistry of the elements comprising a solid, the structure of the solid, and the bonding in the solid. Elementary aspects of group theory and representation theory. Hybridization and molecular orbital approaches to bonding extended to the solid state. Band structures and densities of states of simple crystals. Crystal structures. Structure of and bonding in surfaces, amorphous materials, glasses, and liquids. At the level of *Introduction to Group Theory with Applications*, by Burns; and *Solids and Surfaces: A Chemist's View of Bonding in Extended Structures*, by Hoffmann.

Related Course in Another Department
Introductory Solid-State Physics (Physics 454)

Further Graduate Courses

MS&E 610 Principles of Diffraction (also A&EP 711)
Spring. 4 credits. Offered alternate years. For description see A&EP 711.

[MS&E 611 Modern Polymer Physics
Spring. Fall. 3 credits. Prerequisites: MS&E 452, ChemE 711, or equivalent. Offered alternate years. Not offered 1992–93.
Modern engineering plastics and polymeric matrices for fiber-reinforced composite materials often demand more detailed knowledge of polymer structure and properties in the melt or solid state than is afforded by beginning courses that emphasize polymer solutions. This course is a fundamental approach to the structure and physical properties of polymers, copolymers, and polymer mixtures, including thermodynamics, phase equilibria, diffusion, kinetics of phase separation, surfaces, and interfaces. At the level of *Scaling Concepts in Polymer Physics* by de Gennes.]

MS&E 612 Solid-State Reactions
Spring. 3 credits.
Point defects (thermal disorder, component-activity-dependent disorder, influence of dopants, different kinds of associates, Coulomb interaction between point defects), dislocations, grain boundaries transport in solids (definition and different types of diffusion coefficients, reference frames, mechanisms of electrical conduction, elementary diffusion mechanisms, atomic theory of transport, correlation effects, phenomenological theory of transport including some aspects of thermodynamics of irreversible processes, Fick's laws), point-defect relaxation (migration controlled, phase-boundary-reaction controlled), interdiffusion, solid-state reactions involving compound formation (oxidation of metals, reactions between solids), demixing of materials in potential gradients, selected solid-state processes (internal reactions, solid-state galvanic cells, etc.).

MS&E 613 Structural Defects in Solids
Spring. 3 credits. Offered on demand.
Structure and interactions of point, line, planar, and volume defects in crystalline materials. Follows the concept of a "defect hierarchy" increasing from "0" through 3 dimensions. Specific examples are taken from metals, ionic solids, covalent solids, and polymers. Discussion of the "structure" of point defects. General properties of dislocations and dislocations in particular systems. Interaction of these defects in relation to dislocation climb, lock formation, the effect on mechanical properties, etc. Low- and high-angle grain boundaries, phase boundaries and relation to dislocations. Interaction (absorption) of point defects and dislocations with (by) interfaces. Kinetics of defect movement. Defects in non-crystalline solids. At the level of *Theory of Dislocations* by Hirth and Lothe.

MS&E 614 Advanced Transmission Electron Microscopy
Fall, spring. 3 credits. Prerequisite: MS&E 518 or permission of instructor. Offered on demand.
Kinematic and dynamic diffraction, dispersion surfaces, and Bloch waves. Anomalous absorption, Kikuchi band theory, and energy-selected images. Contrast-transfer-function theory of phase contrast. Lattice imaging and image modeling. Calculation of multibeam defect images in theory and practice. Weak-beam images. Image processing. High-resolution SEM and STEM images. Convergent beam techniques. Plus selected current topics.

MS&E 615 Advanced Mechanical Properties
Fall or spring. 3 credits. Offered on demand.
Advanced experimental and theoretical aspects of the deformation and failure of structural materials. Although the emphasis is on metals and alloys, attention is also given to glasses, ceramics, semiconductors, and polymeric materials. Topics include theory and practice of mechanical testing, deformation behavior of polycrystal, single-crystal metals and covalently bonded semiconductors, phenomenological theories of deformation, the mechanical equation of states for metals, application to the thermal fatigue problem, micromechanical theories of plastic flow in metals, creep in metals, and the time-dependent deformation of polymers, relationship of microstructure to mechanical properties of metals and polymers, ductile fracture of metals, brittle fracture of metals and cermatics.

MS&E 616 Electronic and Magnetic Materials
Fall or spring. 3 credits. Offered on demand.
Electronic transport properties of metals and semiconductors. Semiconductor devices. Optical and dielectric properties of insulators and semiconductors. Laser materials. Structural aspects of superconducting

materials, ferromagnetism, and magnetic materials. Magnetic memory devices. At the level of *Physics of Semiconductor Devices*, by Sze; *Ferromagnetism*, by Bozworth; and current review articles.

MS&E 618 Laser Processing of Materials
Fall or spring. 3 credits. Offered on demand. Use of high-intensity lasers in the processing of materials to achieve unique microstructures and metastable phases. Topics: fundamentals of the interaction of E&M fields with metals, semiconductors and ceramics, transfer of energy between electronic and phonon systems, kinetics of rapid solidification, metastable phase transformations, microstructure of rapidly solidified materials, and current industrial applications.

MS&E 524/624 Synthesis of Polymeric Materials
Spring. Alternating years. 3 credits. Prerequisite: MS&E 452 or permission of instructor. Preparation of synthetic polymers by step- and chain-growth polymerization: condensation; free radical, anionic, and cationic mechanisms; ring opening and coordination routes. Statistical and kinetic aspects of homopolymer and copolymer formation. Stereochemistry of polymers and spectroscopic methods for polymer analysis. Molecular aspects of polymer design for properties such as conductivity, elasticity, thermal stability, and engineering properties. Topics will also include liquid crystalline polymers, polymers for photoresists, and electronic packaging. At the level of *Principles of Polymerization*, by Odian.

MS&E 622 X-Ray Diffraction in Materials Science
Fall or spring. 3 credits. Offered on demand. X-ray scattering and absorption by materials. Reciprocal lattice and brillouin zones. Space groups and various crystal structures. Diffraction from two- or three-dimensional periodic lattices and effect of thermal vibrations. Experimental techniques in X-ray diffraction with particular emphasis on the use of synchrotron sources. Determination of crystal structure by powder and single-crystal diffraction. Use of X-ray diffraction techniques in materials science in studying phase transformation and texture in materials. Diffraction from surface layers and amorphous materials.

MS&E 671 Synthetic Polymer Chemistry (also CHEME 671 and 675)
Fall. 3 credits. Offered on demand. Prerequisites: Chem 359–360 or equivalent, or permission of instructor. Recommended: M&SE 624.
For description see CHEME 675.

Specialty Courses

MS&E 707 Solar Energy Materials
3 credits. Offered on demand (fall or spring).
3 lecs.
Photovoltaic energy conversion: (1) theory (on the level of Hovel); (2) the role of crystal defects and grain boundaries on the conversion efficiency, and schemes to passivate these defects; (3) current investigations in the DOE program to produce large quantities of solar-grade semiconducting Si; (4) theory and materials for amorphous silicon solar cells.

MS&E 714 Advanced Transmission Electron Microscopy
Fall. 3 credits. Prerequisites: MS&E 518 and 520. Offered on demand.
3 lecs.
Kinematic and dynamic diffraction, dispersion surfaces, and Bloch waves. Anomalous absorption, Kikuchi band theory, and energy selected images. Contrast transfer function theory of phase constrast. Lattice imaging and image modeling. Calculation of multibeam defect images in theory and practice. Weak-beam images. Image processing. High-resolution SEM and STEM images. Convergent beam patterns.

MS&E 716 Transition Metal Oxides (also Chem 716)
Fall. 3 credits. Offered on demand.
For description see Chem 716.

MS&E 779 Special Studies in Materials Sciences
Fall, spring. Variable credit. Offered on demand.
Supervised studies of special topics in materials science.

MS&E 798 Materials Science and Engineering Colloquium
Fall, spring. 1 credit each term. Credit limited to graduate students.
Lectures by visiting scientists, Cornell staff members, and graduate students on subjects of interest in materials sciences, especially in connection with new research.

MS&E 799 Materials Science Research Seminars
Fall, spring. 2 credits each term. For graduate students involved in research projects.
Short presentations on research in progress by students and staff.

MS&E 800/801 Research in Materials Science
800, fall; 801, spring. Credit to be arranged.
Independent research in materials science under the guidance of a member of the staff.

MECHANICAL AND AEROSPACE ENGINEERING

General and Required Courses

M&AE 101 Naval Ship Systems (also Naval Science 102)
Spring. 3 credits. Limited to freshmen and sophomores. A free elective for engineering students.
An introduction to primary ship systems and their interrelation. Basic principles of ship construction. Stability, propulsion, control, internal communications, and other marine systems.

M&AE 102 Drawing and Engineering Design (also ENGRG 102)
Fall, spring. 1 credit. Half-term course offered twice each semester. Enrollment limited to thirty students each half term. Recommended for students without previous mechanical drawing experience. S-U grades optional.
2 lecs, 1 lab.
For description see Engineering Common Courses.

M&AE 117 Introduction to Mechanical Engineering (also Engr 117)
Fall. 3 credits.
2 lecs, 1 lab.
For description see Engineering Common Courses.

[M&AE 119 Introduction to Manufacturing (also ENGRI 119 or OR&IE 119)
Spring. 3 credits. May not be offered 1992–93.
2 lecs, 1 lab.
For description see Engineering Common Courses.]

M&AE 221 Thermodynamics (also ENGRD 221)
Fall, spring. 3 credits. Prerequisites: Mathematics 192 and Physics 112.
For description see Engineering Common Courses.

M&AE 312 Fundamentals of Manufacturing Processes (also MS&E 345)
Spring; may be offered in Engineering Cooperative Program. 3 credits. Prerequisites: Engr 202 and 261, or permission of instructor.
2 lecs, 1 lab; evening exams and prelims may be given. N. Zabaras.
Yield criteria and plastic flow. Manufacturing processes for engineering materials, including metals, polymers, ceramics, and composites. Casting, forming, material removal, and joining processes.

M&AE 323 Introductory Fluid Mechanics
Fall; usually offered in Engineering Cooperative Program. 4 credits. Prerequisites: Engr 202 and 203 and coregistration in 221, or permission of instructor.
4 lecs, evening prelims. D. A. Caughey.
Statics, kinematics, potential flow, dynamics, momentum, and energy relations. Thermodynamics of compressible flow; dimensional analysis; real fluid phenomena, laminar and turbulent motion, boundary layer; lift and drag; supersonic flow and shock waves.

M&AE 324 Heat Transfer
Spring; may be offered in Engineering Cooperative Program. 3 credits. Prerequisite: M&AE 323.
3 lecs, evening prelims, evening problem sessions. K. E. Torrance.
Conduction of heat in steady and unsteady situations. Surfaces with fins and systems with heat sources. Forced and natural convection of heat arising from flow around bodies and through ducts. Heat exchangers. Emission and absorption of radiation; radiative transfer between surfaces. Introduction to boiling and phase change.

M&AE 325 Mechanical Design and Analysis
Fall; usually offered in Engineering Cooperative Program. 4 credits. Prerequisites: Engr 202 and 203.
3 lecs, 1 lab. Evening prelims may be given. Lab fee $25. D. L. Bartel.
Application of the principles of mechanics and materials to problems of analysis and design of mechanical components and systems. A hands-on laboratory, the use of machine tools, and a final design project provide direct experience of creative design synthesis.

M&AE 326 System Dynamics
Spring; may be offered in Engineering Cooperative Program. 4 credits. Prerequisite: Mathematics 294, Engr 203, and Engr 210. Junior standing required.
3 lecs, 1 lab, evening prelims.
J. F. Booker and J. C. Koechling.
Dynamic behavior of mechanical systems: modeling, analysis techniques, and applications; vibrations of single- and multi-degree-

of-freedom systems; feedback control systems, stability analysis. Computer simulation and experimental studies of vibration and control systems.

M&AE 427 Mechanical Engineering Laboratory
Fall. 4 credits. Prerequisites: M&AE 324 and 326. Fulfills the writing requirement.
1 lec, 2 labs.
Laboratory exercises in methods, techniques, and instrumentation used in mechanical engineering. Measurements of temperature, heat transfer, viscosity, drag, fluid-flow rate, effects of turbulence, shock wave phenomena, two-phase flows and engine performance. Weekly written assignments.

M&AE 428 Engineering Design
Fall. 1 credit. Prerequisite: completion of six semesters in mechanical engineering or equivalent.
1 lec.
A comprehensive look at principles of design with a focus on case studies. Examples taken from fluid, thermal, and energy areas, as well as mechanical systems and the manufacturing area of mechanical engineering. Special emphasis on the design sources of engineering failures in products, machines, and mechanical systems, as well as how design should relate to a successful manufactured product.

Mechanical Systems and Design and Manufacturing

M&AE 386 Automotive Engineering
Spring. 3 credits. Prerequisite: M&AE 325 or permission of instructor.
3 lecs. J. Lumley.
Selected topics in the analysis and design of vehicle components and vehicle systems. Emphasis on automobiles, trucks, and related vehicles. Power plant, drive line, brakes, aerodynamics, suspension, and structure. Other types of vehicle may be considered.

M&AE 389 Computer-Aided Design
Spring. 3 credits. Limited to juniors and seniors. Prerequisite: A course in programming. May be taken either before or in conjunction with a numerical-methods course. Fulfills computer applications requirement.
D. L. Taylor.
A first course in CAD, introducing the use of software and computer methods in mechanical engineering. Topics include simulation, optimization, solution of field equations (finite elements, finite differences), least-square function approximation, geometry (space curves, splines, patches), and computer graphics.

M&AE 417 Introduction to Robotics
Fall or spring. 3 credits. Enrollment limited.
J. C. Koechling.
Coordinate transformations for manipulator kinematics. Newton-Euler and Lagrangian developments of manipulator dynamics. Robot control schemes. Trajectory generation. Motion planning. Robot programming. Fulfills computer applications requirement.

M&AE 425 Design: Beyond the Imaginary
Fall. 3 credits. Prerequisite: M&AE 325 or permission of instructor. Lab fee $25.
S. Landsberger.
Serves as a mechanical engineering field elective, but does *not* require a comprehensive technical report on the design project and does *not* fulfill the field design requirement. For description see M&AE 525.

[M&AE 429 Changing Aspects of Engineering Practice (also ENGRG 429)
Not offered 1992–93.
See course description under ENGR 429.]

[M&AE 464 Design for Manufacture
Spring. 3 credits. Prerequisites: M&AE 312 and 428 and senior standing. Enrollment limited. Fulfills field design requirement. Not offered 1992–93.
Principles and methodologies for conceptual design; elimination procedures for selecting design alternatives; emphasis on design for manufacturability, quality, and cost considerations; team design projects from concept, analysis, and computer-aided drafting to manufacturing methods.]

M&AE 465 Biomechanical Systems—Analysis and Design
Spring. 3 credits. Prerequisites: Engr 202 and 203.
2 lecs, 1 lab. D. L. Bartel.
Selected topics from the study of the human body as a mechanical system. Emphasis on the modeling, analysis, and design of biomechanical systems frequently encountered in orthopaedic engineering and rehabilitation engineering.

M&AE 478 Feedback Control Systems (also ELE E 471)
Fall. 4 credits. Prerequisite: ELE E 302, M&AE 326, or permission of instructor.
3 lecs. Open computer lab. M. L. Psiaki.
Analysis techniques, performance specifications, and analog-feedback-compensation methods for single-input, single-output, linear, time-invariant systems. Laplace transforms and transfer functions are the major mathematical tools. Design techniques include root locus, frequency response, and algebraic pole placement. Feedback architectures include PID, PDF, and lead/lag compensation. Applications include robotics, aerospace vehicles, and industrial processes. Computer-aided design laboratory examines modeling and control of a computer-simulated dynamic system.

M&AE 486 Automotive Engineering Design
Spring. 3 credits. Prerequisite: M&AE 428 and senior standing. Fulfills field design requirement.
J. Lumley.
For description see M&AE 386.

M&AE 489 Computer-Aided Design Project
Spring. 4 credits. Prerequisite: M&AE 428; limited to seniors in mechanical engineering. Fulfills both field design and computer applications requirements.
D. L. Taylor.
Requires extensive project in addition to course assignments. For description see M&AE 389.

[M&AE 512 Analysis of Materials Processing
Spring. 3 credits. Prerequisite: M&AE 312. Not offered 1992–93.
Review of the basic principles governing the inelastic behavior of solids. Application of slab models, bound theorems, and slipline theory to problems of forging, extrusion, and rolling. Analysis of sheet-metal forming, including forming limits and springback. Discussion of defect initiation during forming processes.]

M&AE 514 Modeling, Metrology, and Machining
Fall. 3 credits, or 4 with laboratory. Prerequisites: Mathematics 294, Engr 100, and Engr 102.
3 lecs, 1 lab (optional).
Introduction to the main principles and current state of the art of three technologies central to modern mechanical design and manufacturing: solid modeling, for defining "shapes" unambiguously; geometric tolerancing and dimensional metrology, for specifying and verifying variations in part geometry; and NC machining, for making parts under program control.

M&AE 525 Design: Beyond the Imaginary
Fall. 4 credits. Prerequisite: MA&E 325 or permission of instructor. Lab fee $25. Requires a comprehensive technical report on the design project and fulfills field design requirement.
S. E. Landsberger.
Students will form teams to design, analyze, and create a prototpye of a new mechanism. The experience of creative synthesis is of primary importance; analytic skills will play a critical role in both concept evaluation and final design specification. The course aims to develop an appreciation for the balanced interplay between the synthetic, analytic, and "just build it and see" processes. Student teams will present their work and analysis techniques of special relevance to their design, e.g., dynamic simulation and kinematic analysis CAD packages. Eclectic design topics include human powered vehicles, robot submarines, technology appropriate for non-industrialized nations, and projects for local industry.

M&AE 555 Introduction to Composite Materials (also T&AM 555)
For course description see T&AM 555.

M&AE 569 Mechanical and Aerospace Structures I: Applied Analysis of Stress and Deformation
Fall. 3 credits. Prerequisite: Engr 202 and M&AE 325 or permission of instructor.
J. F. Booker.
A study of advanced topics in the analysis of stress and deformation of elastic bodies, with applications to the analysis and design of mechanical and aerospace systems. Fundamentals are reviewed and applied to classical problems of solid and structural mechanics.

M&AE 570 Intermediate Dynamics (also T&AM 570)
For course description see T&AM 570.

[M&AE 575 Microprocessor Applications
Fall. 3 credits. Enrollment limited. Prerequisite: background in basic laboratory electronics. Fulfills computer applications requirement. Not offered 1992–93.
Introduction to digital circuitry, microprocessors, and microprocessor-based data acquisition and control systems. Basic concepts of data representation, microprocessor and microcomputer structure, parallel and serial input/output, analog-to-digital conversion, and hardware and software requirements for interfacing. Emphasis on applications of the 8088 microprocessor and assembly language programming. Independent laboratory work on several applications projects, including the process control procedures.]

M&AE 577 Mechanical Vibrations (also T&AM 574)
Fall or spring. 3 credits. Open to qualified undergraduates. Prerequisite: M&AE 326 or equivalent.
2 lecs, 1 lab (occasional). W. H. Sachse.
Vibration phenomena in single– and multiple–degree-of-freedom linear and nonlinear systems, with emphasis on engineering problems involving analysis and design.

M&AE 578 Feedback Control Systems Design and Implementation
Spring. 3 credits. Prerequisite: M&AE 478 or ELE E 471, or permission of instructor. Fulfills the computer application requirement.
1 lec, 2 labs. M. L. Psiaki.
Further development of the theory, design, and implementation of feedback control systems with particular emphasis on applications, modeling and system identification, and hardware implementation. Digital control is introduced. Labs include real-time microprocessor-based control of a D.C.-motor positioning system, a two-link robot arm, and a two-tank level-control system.

[M&AE 589 Computer-aided Research, Design, and Development
Fall. 3 credits. Prerequisite: M&AE 389 or equivalent. Not offered 1992–93.
Introduction to a wide range of topics and programming techniques that are useful in the development of engineering models for computer analysis. Emphasis on data structure and integration of existing packages. Extensive use of computer graphics. Intended to prepare students to take an active role in the development of CAD software. Topics include computer graphics, data structures, 3-D modeling, role of new languages (LISP, PROLOG, etc.), and program development and debugging.]

M&AE 590 Design: Beyond the Imaginary
Spring. 4 credits. Lab fee $25. Intended for students in M.Eng.(Mechanical) program. Fulfills M.Eng. (M.E.) design requirement. For a description see M&AE 525.

[M&AE 610 Solid Modeling
Spring. 4 credits. Prerequisites: graduate standing, at least two years of engineering mathematics, programming competence. Not offered 1992–93.
Development of mathematical and computational methods of modeling one-, two-, and three-dimensional solids, using principles from geometry, topology, and computer science. M&AE 610 focuses on models and representations; a sequel, M&AE 611, focuses on algorithms, applications, and systems that use solid models. The pair provide foundations for CAD/CAM research and system development.]

[M&AE 611 Applications of Solid Modeling
Fall or spring. 2–4 credits to be arranged. Prerequisites: M&AE 610 or permission of instructor. Not offered 1992–93.
Continuation of M&AE 610 with a focus on applications—specifically, a study of algorithms based mainly on set membership classification, together with their design and use in programs and systems for mechanical design and manufacturing (CAD/CAM).]

[M&AE 612 Motional-Process Modeling: Manipulation and Machining
Spring, on demand. 4 credits. Prerequisites: M&AE 326, 478, and 610, or permission of instructor Not offered 1992–93.
Modeling of the spatial and dynamical behavior of machine tools and industrial robots, using principles from geometric modeling, classical dynamics, manufacturing-process dynamics, and control theory. Characterization of the performance of machine tools and robots in terms of physical architectures, control strategies, and software environments.]

M&AE 655 Advanced Composite Materials and Structures (also T&AM 655)
For course description see T&AM 655.

[M&AE 665 Advanced Topics in Orthopaedic Biomechanics
On demand. 4 credits. Prerequisites: graduate standing, prior or concurrent registration in advanced courses in strength of materials or elasticity, and intermediate dynamics. Not offered 1992–93.
Advanced treatment of topics in the biomechanics of the musculoskeletal system. Force analysis of the musculoskeletal system under static and dynamic conditions, compact and trabecular bone as structural materials, structural analysis of bone-implant systems, remodeling of bone.]

M&AE 670 Mechanical and Aerospace Structures II: Finite-Element Method for Linear Mechanics
Spring. 4 credits. Prerequisite: M&AE 569 or permission of instructor. Fulfills computer applications requirement.
J. F. Booker.
Introduction to the finite-element method for static and dynamic analysis of mechanical and aerospace structures (and related nonstructural applications such as heat conduction). Primary emphasis on underlying mechanics and the numerical solution of boundary-value problems. Secondary consideration of inherent capabilities and limitations of large, general-purpose structural mechanics programs. Introduction to computational aspects through development of small, special-purpose program for beams, torsional members, and 2-D continuum.

[M&AE 678 Optimal Control and Estimation
Fall, on demand. 3 credits. Prerequisite: M&AE 478, ELE E 471, or permission of instructor; programming ability in FORTRAN, Pascal, or C. Corequisite: ELE E 521. Not offered 1992–93.
Develops the theory of the design of modern multi-input–multi-output feedback control systems using optimal control techniques. Topics covered include trajectory optimization and the minimum principle, bang-bang optimal control solutions, Kalman filtering, LQR/LQE compensator design, suboptimal control and estimation, and applications to regulator and tracking problems. Both linear and nonlinear systems, and continuous-time and discrete-time control, and considered.]

[M&AE 679 Modeling and Simulation of Dynamic Systems
Spring. 4 credits. Open to qualified undergraduates with permission of instructor. Not offered 1992–93.
Practice tools with selected applications from diverse fields. Representation of continuous dynamic systems by state-variable models. Simulation by numerical integration using procedural languages (such as FORTRAN and Pascal) and digital simulation packages (such as CSMP and STELLA). Special topics in linear and nonlinear dynamics. Term project.]

[M&AE 682 Hydrodynamic Lubrication: Fluid-Film Bearings
On demand. 4 credits. Not offered 1992–93.
J. F. Booker.
Theory of hydrodynamic lubrication and its application to the analysis and design of fluid-film bearings and other devices. General topics include viscous flow in thin films, self-acting and externally pressurized bearings with liquid and gas lubricant films, bearing-system dynamics, and computational methods. Selected special topics such as elastohydrodynamic lubrication and artificial joints. Term project.]

[M&AE 685 Optimum Design of Mechanical Systems
On demand. 4 credits. Prerequisite: graduate standing or permission of instructor. Not offered 1992–93.
The formulation of design problems frequently encountered in mechanical systems as optimization problems. Theory and application of methods of mathematical programming for the solution of optimum design problems.]

[M&AE 715 Theory and Practice in Inelastic Deformation
Fall. 4 credits. Prerequisites: graduate standing and introductory finite-element course, or permission of instructor. Offered alternate years. Not offered 1992–93.
N. Zabaras.
Topics in finite-deformation inelasticity in the framework of modern continuum mechanics. Material and geometric non-linear formulations on theoretical as well as practical grounds. Emphasis is on developing the underlying principles for proper formulation of engineering boundary-value problems with inelastic constitutive equations. Introductory small-scale simulations to illustrate the principles are also developed. Applications include inelastic design, metal forming, polymer processing, ice mechanics, and powder consolidation. Familiarity with compact tensor notation is recommended but not required.]

[M&AE 716 Advanced Deformation Process Simulation
Spring. 4 credits. Prerequisites: graduate standing and M&AE 715, or permission of instructor. Offered alternate years. Not offered 1992–93.
P. R. Dawson.
Application of advanced mechanics theories to the simulation of the deformations of solids, with special attention toward materials processing and other severe-loading environments. The selection of model equations based on dominant features of the material behavior and kinematics of a particular application is stressed. The use of state-variable constitutive models are discussed, including micromechanical models such as those of polycrystal plasticity. Assignments consist of simulation projects that assume a working knowledge of the finite-element method.]

Energy, Fluids, and Aerospace Engineering

M&AE 405 Introduction to Aeronautics
Fall. 3 credits. Limited to upperclass engineers; others with permission of instructor.
F. K. Moore.
Introduction to atmospheric-flight vehicles. Principles of incompressible and compressible aerodynamics, boundary layers, and wing theory. Propulsion system characteristics. Static aircraft performance; range and endurance. Elements of stability and control.

[M&AE 439 Acoustics and Noise
Spring. 3 credits. Prerequisite: some knowledge of fluid mechanics or permission of instructor. Not offered 1992–93.
Sound propagation, transmission, and absorption. Sound radiation by surfaces and flow. Loudspeakers. Room acoustics and noise-control techniques. Hearing, music, noise, and noise-control.]

[M&AE 441 Advanced Thermodynamics with Energy Applications
Spring. 3 credits. Prerequisites: M&AE 221 and 323, or permission of instructor. Not offered 1992–93.
Brief review of classical thermodynamics. Applications to power cycles and refrigeration cycles of particular interest to energy systems. Other topics include the thermodynamic properties of pure systems, phase and chemical equilibria. Brief introduction to statistical thermodynamics.]

M&AE 449 Combustion Engines
Spring. 3 credits. Prerequisites: Engr 221 and M&AE 323.
E. Fisher.
Introduction to combustion engines, with emphasis on the application of thermodynamic and fluid-dynamic principles affecting their performance. Air-standard analyses, chemical equilibrium, ideal-cycle analyses, deviations from ideal processes, combustion knock. Formation and control of undesirable exhaust emissions.

[M&AE 506 Aerospace Propulsion Systems
Spring. 3 credits. Prerequisite: M&AE 323 or permission of instructor. Offered alternate years. Not offered 1992–93.
3 lecs.
Application of thermodynamic and fluid-mechanic principles to the design and performance of aerospace systems. Jet propulsion principles, including rockets. Pollution characteristics. Future possibilities for improved performance.]

M&AE 507 Dynamics of Flight Vehicles
Spring. 3 credits. Prerequisites: M&AE 405 and Engr 203, or permission of instructor. Offered alternate years.
Introduction to stability and control of atmospheric-flight vehicles. Review of aerodynamic forces and methods for analysis of linear systems. Static stability and control. Small disturbance equations of unsteady motion. Dynamic stability of longitudinal and lateral-directional motions; transient control response. At the level of *Dynamics of Flight: Stability and Control*, by Etkin.

M&AE 530 Fluid Dynamics
Fall. 3 credits. Prerequisites: M&AE 323 and senior or graduate standing, or permission of instructor.
F. K. Moore.
Inviscid fluid dynamics and aerodynamics, including imcompressible and supersonic flows, flow over bodies, lift, and drag. Shock waves. Courses 530 and 531 are of interest primarily to seniors and M.Eng. students; however, incoming M.S. or Ph.D. students who will not major in fluid mechanics but need competence in problem solving and basic problem formulation should be interested also. The courses may be taken independently or as a sequence.

M&AE 531 Boundary Layers
Spring. 3 credits. Prerequisites: M&AE 323 and senior or graduate standing, or permission of instructor. Recommended: M&AE 530 or equivalent.
S. Leibovich.
Review of the Navier-Stokes equation, simple exact solutions, concept of scaling. Classical laminar boundary layer theory. Physical mechanisms of boundary layer formation; flat plate boundary layer. Method of matched asymptotic expansions for singular perturbation problems of boundary layer type. Similarity solutions. Blasius series for boundary layer flow past an arbitrary two-dimensional body. Behavior of boundary layer flows near a separation point. Interactive boundary layer theory. Concepts of stability and transition to turbulence. Deterministic chaos. Some results of stability theory for boundary layers. Fully developed turbulence, turbulent wall layer structure, turbulent boundary layers.

M&AE 536 Turbomachinery and Applications
Spring. 3 credits. Prerequisite: M&AE 323 or equivalent.
3 lecs. F. K. Moore.
Aerothermodynamic design of turbomachines in general, energy transfer between fluid and rotor in specific types, axial and radial devices, compressible flow. Three-dimensional effects, surging.

[M&AE 543 Combustion Processes
Spring. 3 credits. Prerequisites: M&AE 323 and 324. Not offered 1992–93.
An introduction to combustion and flame processes, with emphasis on fundamental fluid dynamics, heat and mass transport, and reaction-kinetic processes that govern combustion rates. Thermochemistry, kinetics, vessel explosions, laminar and turbulent premixed and diffusion flames, droplet combustion, combustion of solids.]

M&AE 554 Solar Engineering Design
Spring. 3 credits. Prerequisites: M&AE 428 and senior standing in M&AE. Fulfills field design requirement. Enrollment limited to 30.
A broad coverage of solar-energy utilization by humankind. Fundamentals of solar radiation. Direct radiation as a source of heat and work. Indirect radiation utilization or natural collection; water power, windpower, and biomass. The production of liquid and gaseous fuels. Solar architecture and environmental control by both active and passive means. Each student will execute a design project in solar engineering. Course grade will be based on the design project; presentation of a design proposal, an oral presentation on progress of project, and submission of a final design report.

M&AE 556 Power Systems
Fall. 3 credits. Corequisites: M&AE 428 and senior standing. Fulfills field design requirement.
P. L. Auer.
A broad survey of methods of large-scale power generation, emphasizing energy sources, thermodynamic cycle considerations, and component description. Power-industry, economic, and environmental factors, trends, and projections.

M&AE 559 Introduction to Controlled Fusion: Principles and Technology (also ELE E 484 and NS&E 484)
Spring. 3 credits. Prerequisites: Physics 112, 213, and 214, or equivalent background in electricity and magnetism and mechanics with permission of instructor. Intended for seniors and graduate students.
3 lecs.
This course is intended to give engineering and physical science students an introduction to the physical basis and technological requirements for generating useful power by nuclear fusion. For complete description see NS&E 484.

M&AE 601 Foundations of Fluid Dynamics and Aerodynamics
Fall. 4 credits. Prerequisite: graduate standing or permission of instructor.
Foundations of fluid mechanics from an advanced viewpoint. Aspects of kinetic theory as it applies to the formulation of continuum fluid dynamics. Surface phenomena and boundary conditions at interfaces. Fundamental kinematic descriptions of fluid flow, tensor analysis, derivation of the Navier-Stokes equations and energy equation for compressible fluids. Viscous flows, boundary layers, potential flows, vorticity dynamics.

M&AE 602 Incompressible Aerodynamics
Fall or spring. 4 credits. Prerequisite: M&AE 601 or equivalent. Open to qualified undergraduates with permission of instructor.
Basic equations for inviscid fluid motion. Vorticity dynamics. General results for irrotational flows. Integral representations via Green's theorem. Solution methods based on singularities. Complex variable technique for two-dimensional flows. Airfoil, wing, and slender-body theories. Unsteady phenomena. Three-dimensional boundary layers and separation.

M&AE 603 Compressible Aerodynamics
Fall. 4 credits. Prerequisite: M&AE 601 or equivalent, or permission of instructor.
Basic conservation laws and fundamental theorems of compressible fluid flow. The accoustic approximation. One-dimensional unsteady flows. Characteristics and shock waves. Exact solutions of steady flows. General methods for two-dimensional and axisymmetric steady flows and Bateman principles. Hodograph method. Characteristics method for steady supersonic flows. Approximate methods, series expansion, and perturbation theories; transonic and hypersonic flows.

[M&AE 608 Physics of Fluids
Fall. 4 credits. Prerequisite: graduate standing or permission of instructor. Not offered 1992–93.
Kinetic theory of gases: collisions; transport properties; derivation of the macroscopic equations of mass, momentum, and energy. Statistical mechanics of gases: microcanonical ensemble; partition functions; calculation of thermodynamic properties. Introduction to wave mechanics: harmonic oscillator, rigid rotator, one-electron atom. Atomic and molecular structure: building-up principle, Born-Oppenheimer approximation.]

[M&AE 639 Aerodynamic Noise Theory
Fall, on demand. 4 credits. Prerequisites: Graduate standing and knowledge of fluid mechanics, or permission of instructor. Not offered 1992–93.
Topics in acoustics relevant to transportation noise sources and control. Lighthill and Ffowcs Williams formulations for sound generation. Deterministic and broadband sources. Propagation, nonlinear effects, absorption, diffraction, and transmission. Applications to aircraft, automobiles, propellers, fans, jets, etc.]

M&AE 651 Advanced Heat Transfer
Spring. 4 credits. Prerequisite: graduate standing or permission of instructor.
C. T. Avedisian.
Advanced treatment of conductive and convective heat transfer. Basic equations reasoned in detail. Integral and differential formulations. Exact and approximate solutions. Forced convection. Natural convection. Laminar and turbulent flows. Effects of viscous dissipation and mass transfer.

[M&AE 652 Thermodynamics and Phase-Change Heat Transfer (also CHEME 721)
Spring, on demand. 4 credits. Prerequisite: graduate standing or permission of instructor. Not offered 1992–93.
Thermodynamics of phase change. Superheated liquids and supersaturated vapors. Thermodynamic stability criteria for metastable liquids and homogeneous nucleation theory. Dynamics of bubble growth and collapse. Pool boiling and the critical heat flux. Hydrodynamics of one-dimensional two-phase flows.]

[M&AE 653 Experimental Methods in Fluid Mechanics, Heat Transfer, and Combustion
Spring. 4 credits. Not offered 1992–93.
2 lecs, 1 lab.
Study of experimental techniques for measuring pressure, temperature, velocity, and composition of gases, with emphasis on experimental capabilities and physical principles. Topics include laser velocimetry, hot-wire anemometry, spectroscopy, and laser scattering.]

[M&AE 732 Analysis of Turbulent Flows
Spring. 4 credits. Prerequisite: M&AE 601 or permission of instructor. Offered alternate years. Not offered 1992–93.
S. B. Pope.
Study of methods for calculating the properties of turbulent flows. Characteristics of turbulent flows. Direct numerical simulations, large-eddy simulations, and the closure problem. Reynolds-stress equation: effects of dissipation, anisotropy, deformation. Transported scalars. Probability density functions (pdf's): definitions and properties, transport equations, relationship to second-order closures, stochastic modeling, Langevin equation, and Monte Carlo solutions. The course emphasizes comparison of theory with experiment.]

[M&AE 733 Stability of Fluid Flow
Spring, on demand. 4 credits. S-U grades only. Prerequisite: graduate standing or permission of instructor. Not offered 1992–93.
S. Leibovich.
Introduction to stability and bifurcation of fluid flow. Energy stability theory. Convective instability, the Benard problem. Taylor instability of rotating couette flow. Stability of parallel flows. Critical-layer singularities and methods of resolution. Boundary layers, slight departures from parallel flow. Stratified flows and the Taylor-Goldstein equation; swirling flows. Destabilization by "stabilizing" body forces. Modulated nonlinear effects and amplitude equations of the Ginsburg-Landau type. Nonlinear critical-layer dynamics.]

M&AE 734 Turbulence and Turbulent Flow
Fall. 4 credits. Prerequisite: M&AE 601 or permission of instructor.
J. L. Lumley.
Topics include the dynamics of buoyancy and shear-driven turbulence, boundary-free and bounded shear flows, second-order modeling, the statistical description of turbulence, turbulent transport, and spectral dynamics.

M&AE 736 Computational Aerodynamics
Spring. 4 credits. Prerequisites: graduate standing, an advanced course in continuum mechanics or fluid mechanics, and some FORTRAN programming experience.
3 lecs. D. A. Caughey.
Numerical methods to solve inviscid and high-Reynolds-number fluid-dynamics problems, including finite-difference, finite-volume, and surface-singularity methods. Accuracy, convergence, and stability; treatment of boundary conditions and grid generation. Focus on hyperbolic (unsteady flow with shock waves) and mixed hyperbolic-elliptic (steady transonic flow) problems. Assignments require programming digital computer.

M&AE 737 Computational Fluid Mechanics and Heat Transfer
Fall. 4 credits. Prerequisites: graduate standing; an advanced course in continuum mechanics, heat transfer, or fluid mechanics; and some FORTRAN programming experience.
K. E. Torrance.
Numerical methods for elliptic and parabolic partial differential equations arising in fluid flow and heat-transfer problems involving convection and diffusion. Finite-difference, finite-volume, and spectral methods. Accuracy, stability, convergence, and conservation. Review of current methods. Emphasis on steady and unsteady incompressible flows. Assigned problems are solved on a digital computer and at CADIF.

Special Offerings

[M&AE 001 Introduction to Mechanical Technology
Fall, spring. 1 credit. Enrollment limited. S-U grades only. Does not meet any graduation requirements. Not offered 1992–93.
Offered to students lacking a background in basic understanding of mechanical devices and technology. Hands-on experience with various typical devices such as engines, refrigeration units, heat pumps, etc.]

[M&AE 400 Components and Systems: Engineering in a Social Context (also Physics 481 and Science, Technology, and Society 400)
Spring. 3 credits. Prerequisites: upperclass standing, two years of college physics. Serves as a technical elective but not as a field elective in mechanical engineering. Not offered 1992–93.
This course addresses, at a technical level, broader questions than are normally posed in the traditional engineering or physics curriculum. Through the study of individual cases such as the Strategic Defense Initiative (SDI), the National Aerospace Plane, and nuclear power and its alternatives, we investigate interactions between the scientific, technical, political, economic, and social forces that are involved in the development of engineering systems.]

[M&AE 429 Changing Aspects of Engineering Practice (also Engr 429)
Spring. 3 credits. Prerequisite: upperclass engineering standing. Limited enrollment. Serves as a technical elective but not as a field elective in mechanical engineering. Not offered 1992–93.
An introduction to the changing responsibilities of the practicing engineer in an internationally competitive product-development and manufacturing organization. Topics include total quality management, concurrent engineering, design for quality, statistical process control, just-in-time inventory, and self-managed teams. Marketing, purchasing, financial, and legal issues will also be discussed. Student "companies" will be formed.]

M&AE 490 Special Investigations in Mechanical and Aerospace Engineering
Fall, spring. Credit to be arranged. Limited to undergraduate students. Prerequisite: permission of instructor.
Intended for an individual student or a small group of students who want to pursue a particular analytical or experimental investigation outside of regular courses or for informal instruction supplementing that given in regular courses.

M&AE 491 Design Projects in Mechanical and Aerospace Engineering
Fall, spring. 3–6 credits, to be arranged. Prerequisite or corequisite: M&AE 428. Fulfills field design requirement.
Intended for individual students or small groups of students who want to pursue particular design projects outside of regular courses.

[M&AE 520 Mechanical Tolerancing and Dimensional Metrology
Spring. 2 credits. Prerequisites: Math 294 and Engr 102; M & AE 312 is helpful. Seven-week course. Not offered 1992–93.
Current industrial practices in mechanical tolerancing and dimensional metrology, based on the national tolerancing standard ANSI Y14.5 and new revisions to it. Discussion of weaknesses in current methods, and emerging formal theories. Lab experience with manual instruments, functional gauges, coordinate-measuring and surface-measuring machines.]

M&AE 545 Energy Seminar (also NS&E 545)
Fall and spring. 1 credit each semester. Master of Engineering (M.Eng.) students in the energy option are expected to take the seminar course both fall and spring for credit.
1 lecture.
Selected topics related to energy resources, their conversion to electricity, process heat, etc., and the environmental consequences of the energy cycle will be discussed by faculty members from several departments in the College of Engineering, units within the university, and invited experts. Examples of topics that will be surveyed in these lectures are energy resources, economics, and politics; coal-based electricity generation; nuclear

reactors; solar power; energy conservation by users; synthetic fuels; air-pollution control; nuclear-waste disposal; electric-power transmission system; geothermal power; wind power; and advanced oil recovery.

M&AE 592 Seminar and Design Project in Aerospace Engineering
Fall, spring. 2 credits each term. Intended for students in M.Eng.(Aerospace) program. Introduction to topics of current research interest in aerospace engineering by Aerospace faculty and invited speakers. Individual design projects supervised by separate faculty members after introductory sessions.

M&AE 594 Manufacturing Seminar (also OR&IE 894)
Fall, spring. 1 credit. S-U grades optional.
1 sec.
A weekly, practice-oriented seminar with external speakers for Master of Engineering students in several disciplines who are interested in manufacturing. Conducted in cooperation with the School of Operations Research and Industrial Engineering, the Cornell Manufacturing Engineering and Productivity Program (COMEPP), and the Cornell Society of Engineers.

M&AE 690 Special Investigations in Mechanical and Aerospace Engineering
Fall, spring. Credit to be arranged. Limited to graduate students.

M&AE 695 Special Topics in Mechanical and Aerospace Engineering
Fall, spring. Credit to be arranged. Graduate standing and permission of instructor.
Special lectures by faculty members on topics of current research.

M&AE 791 Mechanical and Aerospace Research Conference
Fall, spring. 1 credit each term. S-U grades only. For graduate students involved in research projects.
Presentations on research in progress by faculty and students.

M&AE 794 Graduate Seminar in Manufacturing Processes
Fall, spring. 1 credit. S-U only. Prerequisites: Graduate standing and permission of instructor.
1 sec. K. K. Wang.
A weekly seminar giving graduate students who are working on manufacturing research topics an opportunity to present their work and discuss it with other students and staff. Participation of full-time research associates is also anticipated.

M&AE 799 Mechanical and Aerospace Engineering Colloquium
Fall, spring. 1 credit each term. Credit limited to graduate students. All students and staff invited to attend.
Lectures by visiting scientists and Cornell faculty and staff members on research topics of current interest in mechanical and aerospace science, especially in connection with new research.

M&AE 890 Research in Mechanical and Aerospace Engineering
Credit to be arranged. Prerequisite: candidacy for M.S. degree in mechanical or aerospace engineering or approval of director. Independent research in an area of mechanical and aerospace engineering under the guidance of a member of the faculty.

M&AE 990 Research in Mechanical and Aerospace Engineering
Credit to be arranged. Prerequisite: candidacy for Ph.D. degree in mechanical or aerospace engineering or approval of director. Independent research in an area of mechanical and aerospace engineering under the guidance of a member of the faculty.

NUCLEAR SCIENCE AND ENGINEERING

A number of courses in nuclear science and engineering are offered through the School of Applied and Engineering Physics (see A&EP 609, 612, 633, 634, 636, 638, and 651).

NS&E 121 Fission, Fusion, and Radiation (also ENGRI 121)
Spring. 3 credits.
2 lecs, 1 lab demonstration.
This is a course in the Introduction to Engineering series. For description see Engineering Common Courses.

NS&E 303 Introduction to Nuclear Science and Engineering I (also A&EP 303)
Fall. 3 credits. Prerequisite: Physics 214 or Mathematics 294. This course is designed for juniors or seniors from any engineering field who want to prepare for graduate-level nuclear science and engineering courses at Cornell or elsewhere. It can also serve as a basic course for those who do not intend to continue in the field.
3 lecs. V. O. Kostroun.
Introduction to the fundamentals of nuclear reactors. Topics include an overview of the field of nuclear engineering; nuclear structure, radioactivity, and reactions; interaction of radiation and matter; and neutron moderation, neutron diffusion, the steady-state chain reaction, and reactor kinetics. At the level of *Introduction to Nuclear Engineering*, by Lamarsh.

NS&E 484 Introduction to Controlled Fusion: Principles and Technology (also ELE E 484 and M&AE 559)
Spring. 3 credits. Prerequisites: Physics 112, 213, and 214, or equivalent background in electricity and magnetism and mechanics, and permission of instructor. Intended for seniors and graduate students.
3 lecs. D. A. Hammer.
Introduction to the physical principles and technology underlying controlled-fusion power. Topics include fundamental aspects of the physics of ionized gases at high temperature (thermonuclear plasmas), requirements (in principle) for achievement of net power from fusion, technological problems of an actual fusion reactor, and progress of the fusion program toward overcoming these problems. Both magnetic and inertial confinement fusion are discussed, and comparisons are made between fusion and fission.

NS&E 504 Fission and Fusion Energy Systems
Spring. 3 credits. Prerequisites: Physics and Math 294 or equivalent. Not intended for graduate students majoring in Nuclear Science and Engineering. Open to qualified undergraduates.
3 lecs. D. A. Hammer.
Introduction to the fundamentals of nuclear science and engineering, fission reactors, and controlled fusion power. Topics include the interactions of radiation with matter, including effects on biological systems and detection of radiation; the principles of neutron-induced chain reactions and fission reactors; the technology and physics requirements for the achievement of controlled fusion power and the progress made toward that goal; and radioactive-waste disposal.

NS&E 545 Energy Seminar (also M&AE 545)
Fall and spring. 1 credit each semester. Master of Engineering (M.Eng.) students in the Energy Option are expected to take this seminar both fall and spring for credit.
1 lec.
Energy resources, their conversion to electricity or process heat, and the environmental consequences of the energy cycle will be discussed by faculty members from several departments in the College of Engineering, other units within the university, and invited experts. Examples of topics to be surveyed are energy resources, economics, and politics; coal-based electricity generation; nuclear reactors; solar power; energy conservation by users; synthetic fuels; air-pollution control; nuclear-waste disposal; electric-power transmission systems; geothermal power; wind power; and advanced oil recovery.

NS&E 551 Nuclear Methods in Non-Nuclear Research Fields
Spring. 3 credits. Prerequisite: Physics 214 or 218, or permission of instructor; some upper-division physics desirable. Primarily for graduate students in archaeology, geology, chemistry, biology, materials science, and other non-nuclear fields in which nuclear methods are used. Open to qualified undergraduates. A more intensive related course, A&EP 651, is intended for nuclear specialists.
One 2-hour lec and one 2-1/2-hour lab.
D. D. Clark.
Lectures on interaction of radiation with matter, radiation protection, and nuclear instruments and methods including data reduction. About ten experiments are available on radiation detection, attenuation, and measurement; electronic instrumentation, including computerized systems; activation analysis; and emerging applications such as prompt gamma analysis and neutron radiography. The TRIGA reactor is used. Emphasis is on those nuclear methods, particularly instrumental ones using neutrons, that are used in, or are being adapted for, non-nuclear fields, but tracer and other chemical techniques are not included. Students each select seven or eight experiments to meet their interests and needs. At the level of *Nuclear Analytical Chemistry*, by Brune, Forkman, and Persson.

NS&E 590 Independent Study
Fall, spring. 1–4 credits. Grade option letter or S-U.
Independent study or project under guidance of a faculty member.

NS&E 621 Radiation Effects in Microelectronics (also ELE E 637)
Fall. 3 credits. Prerequisite: Permission of instructor. A seminar intended for seniors and graduate students in engineering or applied physics.
2 1-1/2 hour lecs. S. C. McGuire.
An introduction to the physical processes that underlie the malfunction of microelectronic circuitry resulting from exposure to ionizing

radiation. Basic device-failure mechanisms, including total-dose effects, single-event upsets, and latchup, as well as the roles that circuit testing and modeling methods play in improving circuit design. Impact of surface radiation typical of low-energy electron and photon sources on device fabrication. Reference materials from the current literature.

NS&E 637 Advanced Topics in Plasma Diagnostic Techniques
Fall. 3 credits. Prerequisite: plasma physics at the level of both ELE E 581 and 582 (A&EP 606 and 607) as well as the levels of mathematics and electrodynamics appropriate for those courses.
3 lecs. D. A. Hammer.
Addresses diagnostic methods in depth, emphasizing those that can be and are being used in experiments at Cornell. The complete list of specific topics will be determined by the interests of the participants, but will certainly include laser-based techniques and plasma spectroscopy. (This course does not include a laboratory component. Students interested in laboratory experience should take ELE E 481 instead of or in addition to NS&E 637.)

OPERATIONS RESEARCH AND INDUSTRIAL ENGINEERING

OR&IE 115 Engineering Application of Operations Research (also Engr 115)
Fall, spring. 3 credits. Enrollment not open to OR&IE upperclass majors.
2 lecs, 1 lab.
For description see Engineering Common Courses.

[OR&IE 119 Introduction to Manufacturing (also ENGRI 119 and M&AE 119)
Spring. 3 credits. Enrollment not open to OR&IE upperclass majors. Not offered 1992–93.
2 lecs, 1 lab.
For description see Engineering Common Courses.]

[OR&IE 230 Discrete Mathematics
Spring. 3 credits. Prerequisite: one year of calculus or permission of instructor. Not offered 1992–93.
3 lecs.
A broad but thorough introduction to topics of discrete mathematics of use in a variety of fields of science and engineering. Topics include basic combinatorics and counting techniques, recurrence relations and generating functions, introduction to modular arithmetic with application to coding theory and experimental designs, and basic notions of graph theory with applications in optimization such as maximum flow in a network and project planning.]

OR&IE 260 Introductory Engineering Probability (also ENGRD 260)
Fall, spring, summer. 3 credits. Prerequisite: first-year calculus. Corequisite: Math 293.
3 lecs.
For description see Engineering Common Courses.

OR&IE 270 Basic Engineering Probability and Statistics (also ENGRD 270)
Fall; also spring, summer if staffing permits. 3 credits. Prerequisite: first-year calculus. Enrollment not open to OR&IE upperclass majors.
3 lecs. Evening prelims.
For description see Engineering Common Courses.

OR&IE 320 Optimization I
Fall. 4 credits. Prerequisite: Mathematics 221 or 294.
3 lecs, 1 rec.
Formulation of linear programming problems and solution by the simplex method. Related topics such as sensitivity analysis, duality, and network programming. Applications include such models as resource allocation and production planning.

OR&IE 321 Optimization II
Spring. 4 credits. Prerequisite: OR&IE 320 or equivalent.
3 lecs, 1 rec.
A variety of optimization methods stressing extensions of linear programming and its applications but also including topics drawn from integer, dynamic, and nonlinear programming. Formulation and modeling are stressed as well as numerous applications.

OR&IE 350 Financial and Managerial Accounting
Fall; also spring if staffing permits. Upperclass standing only; enrollment limited. 4 credits.
3 lecs, 1 computing-disc. Evening prelims.
Principles of accounting, financial reports, financial-transactions analysis; financial-statement analysis, budgeting, job-order and process-cost systems, standard costing and variance analysis, economic analysis of short term decisions. Software fee $10.

OR&IE 361 Introductory Engineering Stochastic Processes I
Spring. 4 credits. Prerequisite: OR&IE 260 or equivalent.
3 lecs, 1 rec.
Basic concepts and techniques of random processes are used to construct models for a variety of problems of practical interest. Topics include the Poisson process, Markov chains, renewal theory, models for queueing and reliability.

OR&IE 370 Introduction to Statistical Theory with Engineering Applications
Spring, fall. 4 credits. Prerequisite: OR&IE 260 or equivalent.
3 lecs, 1 rec.
Provides a working knowledge of basic statistics as it is most often applied in engineering and a basis in statistical theory for continued study. Topics include a review of distributions of special interest in statistics; testing simple and composite hypotheses; point and interval estimation; correlation; linear regression.

OR&IE 410 Industrial Systems Analysis
Spring. 4 credits. Co-requisite: OR&IE 270 or 370.
3 lecs, 1 computing session.
Design of production facilities, including engineering economy, taxation effects, materials handling, process design, and facility layout. Operations analysis, including process scheduling, process evaluation, procedural analysis, project management, methods analysis and design, work measurement, inventory control, job evaluation, and quality engineering and control.

OR&IE 416 Design of Manufacturing Systems II
Spring. 4 credits. Senior students only. Co-requisites or prerequisites: at least one of the following courses: OR&IE 417, 451, 525, and 562, or permission of instructor.
2 lecs, 1 lab.
Project course in which students, working in teams, design a manufacturing and/or logistics system and conduct capacity, material flow, and cost analysis of their design. Meetings between project teams and faculty advisers are substituted for some lectures. Analytical methods for controlling inventories, planning production, and evaluating system performance will be presented in lectures. Lab fee $15.

OR&IE 417 Material Handling Systems
Fall. 3 credits.
2 lecs, 1 rec.
Design of the layout of processes and storage areas and the material-handling system for movement of items. Typical equipment used. Material flow analysis. The functions of identification control, storage, movement, batching, merging, and dispersion.

OR&IE 431 Discrete Models
Spring. 4 credits. Prerequisites: OR&IE 320 and COM S 211, or permission of instructor.
3 lecs, 1 rec.
Basic concepts of graphs, networks, and discrete optimization. Fundamental models and applications, and algorithmic techniques for their analysis. Specific models studied include flows in networks, sequencing and scheduling, the traveling salesman problem, and coloring problems.

OR&IE 432 Nonlinear Optimization and Applied Linear Algebra
Fall. 3 credits. Prerequisite: OR&IE 320. Introduction to the practical and theoretical aspects of nonlinear optimization. Attention given to the computational efficiency of algorithms and the application of nonlinear techniques to linear programming; e.g., interior-point methods. Methods of numerical linear algebra introduced as needed.

[OR&IE 435 Introduction to Game Theory
Fall. 3 credits. Not offered 1992–93.
3 lecs.
A broad survey of the mathematical theory of games, including such topics as two-person matrix and bimatrix games; cooperative and noncooperative n-person games; games in extensive, normal, and characteristic function form. Economic market games. Applications to weighted voting and cost allocation.]

OR&IE 451 Economic Analysis of Engineering Systems
Spring. 4 credits. Prerequisites: OR&IE 320 and OR&IE 350.
2 lecs, 1 computing session.
Financial planning, including cash-flow analysis and inventory flow models. Engineering economic analysis, including discounted cash flows and taxation effects. Application of optimization techniques, as in equipment replacement or capacity expansion models. Issues in designing manufacturing systems. Student group project.

OR&IE 462 Introductory Engineering Stochastic Processes II
Spring. 4 credits. Prerequisite: OR&IE 361 or equivalent.

3 lecs, 1 rec.
Stationary processes, martingales, random walks and gambler's ruin problems, processes with stationary independent increments, Brownian motion and other cases, branching processes, renewal and Markov-renewal processes, reliability theory, Markov decision processes, optimal stopping, statistical inference from stochastic models, and stochastic comparison methods for probability models. Applications to population growth, spread of epidemics, and other models.

[OR&IE 472 Statistical Decision Theory
Fall. 3 credits. Prerequisite: OR&IE 370 or equivalent. Not offered 1992–93.
3 lecs.
Decision rules, admissible decision rules, Bayes decision rules, minimax decision rules. Using regret instead of loss. Criteria for choosing a decision rule and relation to theory of games. Use of linear programming to construct minimax decision rules. Building cost of collecting information into the loss function. Decision problems requiring a sequence of decisions over time and relation to dynamic programming. Use of the empirical cumulative distribution function and applications to inventory problems. Classical statistical theory as special cases of statistical decision theory.]

OR&IE 475 Regression
Fall. Second half of term. 2 credits. Prerequisite: OR&IE 270 or 370.
3 lecs, 1 rec.
Linear models; estimation and testing; confidence sets; diagnostics and residual analysis; variable selection and modeling.

OR&IE 476 Experimental Design I
Fall. First half of term. 2 credits. Prerequisite: OR&IE 270 or 370.
3 lecs, 1 rec.
Experimental design to improve industrial products and manufacturing processes. Randomization. Blocking. Fractional factorials. Orthogonal arrays. Nested designs.

OR&IE 499 OR&IE Project
Fall, spring. Credit to be arranged. Prerequisite: permission of instructor.
Project-type work, under faculty supervision, on a real problem existing in some firm or institution, usually a regional organization. Opportunities in the course may be discussed with the associate director.

OR&IE 515 Design of Manufacturing Systems
Spring. 4 credits. Prerequisite: permission of instructor.
For description see OR&IE 416. Lab fee $15.

OR&IE 520 Operations Research I: Optimization I
Fall. 4 credits. Prerequisite: Mathematics 221 or 294. Intended for graduate students minoring in operations research. The same course as OR&IE 320, but on the graduate level.
3 lecs, 1 rec.
For description see OR&IE 320.

OR&IE 521 Optimization II
Spring. 4 credits. Prerequisite: OR&IE 320 or 520 or equivalent. Intended for graduate students in other fields. Lectures concurrent with OR&IE 321.
3 lecs, 1 rec.
A variety of optimization methods stressing extensions of linear programming and its applications but also including topics drawn from integer, dynamic, and nonlinear programming. Formulation and modeling are stressed, as well as numerous applications.

OR&IE 523 Operations Research II: Introduction to Stochastic Modeling
Spring. 4 credits. Prerequisite: OR&IE 260 or equivalent. Intended for graduate students in other fields. Lectures concurrent with OR&IE 361.
3 lecs, 1 rec.
Basic concepts and techniques of random processes are used to construct models for a variety of problems of practical interest. Topics include the Poisson process, Markov chains, renewal theory, models for queuing and reliability.

OR&IE 525 Production Planning and Scheduling Theory and Practice
Fall. 4 credits. Prerequisite: OR&IE 320.
3 lecs, 1 sec.
Production planning, including MRP, linear programming, and related concepts. Scheduling and sequencing problems. Single-resource scheduling, parallel processing, flow-shop, and job-shop scheduling. Job release strategies and control of work in process inventories. Focus on setup time as a determinant of plans and schedules.

OR&IE 561 Queuing Theory and Its Applications
Fall. 3 credits. Prerequisite: OR&IE 361 or permission of instructor.
3 lecs.
Basic queuing models. Delay and loss systems. Finite source, finite capacity, balking, reneging. Systems in series and in parallel. Various queue disciplines. Busy-period problems. Design and control problems. Statistical inference from queuing processes. Priority systems. Queuing networks. Applications to equipment maintenance, telephone traffic, and computer operations.

OR&IE 562 Inventory Theory
Spring. 4 credits. Prerequisite: OR&IE 321, 361 or permission of instructor.
2 lecs, 1 rec.
Discussion of the nature of inventory systems and their design and control. Periodic and continuous review policies for single-item and single-location problems. Multi-item and multi-echelon extensions. Dynamic and static models are discussed. Distribution problems are analyzed. Applications are stressed.

[OR&IE 563 Applied Time-Series Analysis
Spring. 3 credits. Prerequisites: OR&IE 361 and 370 and COM S 211, or permission of instructor. Not offered 1992–93.
3 lecs.
Box-Jenkins models, which are versatile, widely used, and applicable to nonstationary and seasonal time series, are covered in detail. The various stages of model identification, estimation, diagnostic checking, and forecasting are treated. As time permits other topics, such as spectral analysis, filtering and long-range dependence are discussed. Analysis of real data is carried out. Assignments require computer work with a time-series package.]

[OR&IE 564 Introductory Engineering Stochastic Processes II
Spring. 4 credits. Prerequisite: OR&IE 361 or equivalent. Lectures concurrent with OR&IE 462. Not offered 1992–93.
3 lecs, 1 rec.
For description see OR&IE 462.]

OR&IE 570 Introduction to Statistical Theory with Engineering Applications
Fall. 4 credits. Prerequisite: OR&IE 260 or equivalent. Lectures concurrent with OR&IE 370.
3 lecs, 1 rec.
For description see OR&IE 370.

[OR&IE 575 Experimental Design II
Spring. Last half of term. 2 credits. Prerequisite: OR&IE 476. Not offered 1992–93.
3 lecs, 1 rec.
Continuation of OR&IE 476. Design of industrial experiments. Response surfaces. Robust product designs. Taguchi's methods.]

OR&IE 577 Quality Control
Spring. 3 credits. Prerequisites: OR&IE 270 or 370.
3 lecs, 1 rec.
Concepts and methods for process and acceptance control. Control charts for variables and attributes. Process capability analysis. Acceptance sampling. Continuous sampling plans. Life tests. Use of experimental design and Taguchi methods for off-line control.

OR&IE 580 Design and Analysis of Simulated Systems
Fall. 4 credits. Prerequisites: COM S 211 and OR&IE 370, or permission of instructor.
3 lecs, 1 rec.
Digital computer programs to simulate the operation of complex discrete systems in time. Modeling, program organization, pseudo–random-variable generation, simulation languages, statistical considerations; applications to a variety of problem areas.

OR&IE 599 Project
Fall, spring. 5 credits. For M.Eng. students. Identification, analysis, design, and evaluation of feasible solutions to some applied problem in the OR&IE field. A formal report and oral defense of the approach and solution are required.

[OR&IE 625 Scheduling Theory
Fall. 3 credits. Not offered 1992–93.
3 lecs.
Scheduling and sequencing problems, including single-machine problems, parallel-machine scheduling, and shop scheduling. The emphasis is on the design and analysis of polynomial time optimization and approximation algorithms and on related complexity issues.]

OR&IE 626 Advanced Production and Inventory Planning
Spring. 3 credits.
3 lecs.
Introduction to a variety of production and inventory control planning problems; the development of mathematical models corresponding to these problems; a study of approaches for finding solutions. Introduction to the theory and practice of digital systems simulation.

[OR&IE 627 Dynamic Programming
Fall. 3 credits. Prerequisite: permission of instructor. Not offered 1992–93.
3 lecs.
Optimization of sequential decision processes. Deterministic and stochastic models, infinite-horizon Markov decision models, policy iterations. Contraction mapping methods. Applications drawn from inventory theory, production control.]

OR&IE 630 Mathematical Programming I
Fall. 3 credits. Prerequisites: advanced calculus and elementary linear algebra.
3 lecs.
A rigorous treatment of the theory and computational techniques of linear programming and its extensions. Formulation, duality theory, simplex, and dual simplex methods. Sensitivity analysis. Network flow problems and algorithms. Theory of polyhedral convex sets, systems of linear equations and inequalities, Farkas' Lemma. Exploiting special structure in the simplex method, computational implementation. Decomposition Principle.

OR&IE 631 Mathematical Programming II
Spring. 3 credits. Prerequisite: OR&IE 630.
3 lecs.
A continuation of OR&IE 630. Introduction to nonlinear programming, interior-point methods for linear programming, complexity theory, and integer programming. Some discussion of dynamic programming, and elementary and polyhedral theory.

[OR&IE 632 Nonlinear Programming
Spring. 3 credits. Prerequisite: OR&IE 630. Not offered 1992–93.
3 lecs.
Necessary and sufficient conditions for unconstrained and constrained optima. Duality theory. Computational methods for unconstrained (e.g., quasi-Newton) algorithms, linearly constrained (e.g., active set) algorithms, and nonlinearly constrained (e.g., successive quadratic programming) problems.]

[OR&IE 633 Graph Theory and Network Flows
Spring. 3 credits. Prerequisite: permission of instructor. Not offered 1992–93.
3 lecs.
Directed and undirected graphs. Bipartite graphs. Hamilton cycles and Euler tours. Connectedness, matching, and coloring. Flows in capacity-constrained networks. Maximum flow and minimum cost flow problems.]

[OR&IE 634 Combinatorial Optimization
Fall. 3 credits. Prerequisite: permission of instructor. Not offered 1992–93.
3 lecs.
Topics in combinatorics, graphs, and networks, including matching, matroids, polyhedral combinatorics, and optimization algorithms. A special focus this year will be on the traveling salesman problem, using this canonical example to study algorithms and structural results in the previously mentioned areas.]

OR&IE 635 Interior-Point Methods for Mathematical Programming
Spring. 3 credits. Prerequisites: Math 411 and OR&IE 630, or permission of instructor.
3 lecs.
Interior-point methods arising from Karmarkar's Algorithm. Application to linear and quadratic programming and the linear complementarity problem. Projective-scaling, affine-scaling, path-following, and potential-reduction methods.

OR&IE 636 Integer Programming
Fall. 3 credits. Prerequisite: OR&IE 630.
3 lecs.
Discrete optimization. Linear programming in which the values are restricted to integers. Theory, algorithms, and applications. Cutting-plane methods, enumerative methods, and group-theoretic methods; additional topics are drawn from recent research in this area.

OR&IE 639 Polyhedral Convexity
Fall. 3 credits. Prerequisite: basic knowledge of linear algebra.
A comprehensive introduction to the geometry and combinatorics of polyhedral convex sets. Linear inequalities, supporting and separating hyperplanes. Polarity. Convex hulls, facets, and vertices. Face lattices. Convex cones and polytopes. Minkowski sums. Gale transforms. Simplicial and polyhedral subdivision. Applications to linear programming, combinatorial optimization, and computational geometry.

OR&IE 650 Applied Stochastic Processes
Fall. 4 credits. Prerequisite: a one-semester calculus-based probability course.
3 lecs, 1 rec.
An introduction to stochastic processes that presents the basic theory together with a variety of applications. Topics include Markov processes, renewal theory, random walks, branching processes, Brownian motion, stationary processes, martingales, and point processes.

OR&IE 651 Probability
Spring. 4 credits. Prerequisite: Real analysis at the level of Math 413 and a previous one-semester course in calculus-based probability.
3 lecs, 1 rec.
Sample spaces, events, sigma fields, probability measures, set induction, independence, random variables, expectation, review of important distributions and transformation techniques, convergence concepts, laws of large numbers and asymptotic normality, conditioning.

OR&IE 662 Advanced Stochastic Processes
Fall. 3 credits. Prerequisite: OR&IE 651 or equivalent.
3 lecs.
Brownian motion, martingales, Markov processes, and topics selected from: diffusions, stationary processes, point processes, weak convergence for stochastic processes and applications to diffusion approximations, Lévy processes, regenerative phenomena, random walks.

[OR&IE 663 Time-Series Analysis
Spring. 3 credits. Prerequisite: OR&IE 650 or equivalent. Not offered 1992–93.
3 lecs.
Representations of stationary time series. The ARIMA models. Spectral analysis. Long-range dependence. Problems of estimation. Multivariate time series.]

OR&IE 665 Advanced Queuing Theory
Spring. 3 credits. Prerequisite: OR&IE 650 or equivalent.
3 lecs.
A study of stochastic processes arising in a class of problems including congestion, storage, dams, and insurance. The treatment is self-contained. Transient behavior of the processes is emphasized. Heavy-traffic situations are investigated.

OR&IE 670 Statistical Principles
Fall. 4 credits. Co-requisite: OR&IE 650 or equivalent.
3 lecs, 1 rec.
Review of distribution theory of special interest in statistics: normal, chi-square, binomial, Poisson, t, and F; introduction to statistical decision theory; sufficient statistics; theory of minimum variance unbiased point estimation; maximum likelihood and Bayes estimation; basic principles of hypothesis testing, including Neyman-Pearson Lemma and likelihood ratio principle; confidence interval construction; introduction to linear models.

[OR&IE 671 Intermediate Applied Statistics
Spring. 3 credits. Prerequisite: OR&IE 670 or equivalent. Not offered 1992–93.
3 lecs.
Statistical inference based on the general linear model; least-squares estimators and their optimality properties; likelihood ratio tests and corresponding confidence regions; simultaneous inference. Applications in regression analysis and ANOVA models. Variance components and mixed models. Use of the computer as a tool for statistics is stressed.]

[OR&IE 674 Design of Experiments
Spring. 3 credits. Prerequisite: OR&IE 671 or permission of instructor. Not offered 1992–93.
3 lecs.
Use and analysis of experimental designs such as randomized blocks, balanced incomplete blocks, and Latin squares; analysis of variance and covariance, factorial experiments; statistical problems associated with finding best operating conditions; response-surface analysis.]

OR&IE 676 Statistical Analysis of Life Data
Spring. 3 credits. Prerequisite: OR&IE 671 or equivalent.
Analysis of data from reliability, fatigue, and life-testing studies in engineering; biomedical applications. Survival distributions, hazard rate, censoring. Life tables. Estimation and hypothesis testing. Standards. Goodness of fit, hazard plotting. Covariance analysis, accelerated life testing. Multiple decrement models, competing risks. Sample-size determination. Adaptive sampling.

[OR&IE 678 Asymptotic Methods in Statistics
Spring. 3 credits. Prerequisite: OR&IE 670 or Mathematics 574. Not offered 1992–93.
Large-sample behavior of MLEs and other estimates; chi-square, likelihood ratio, and related tests; Pitman and Bahadur efficiency; LAN families and LAM estimates; statistical applications of Edgeworth expansions; adaptive estimation and semiparametric inference.]

OR&IE 680 Simulation
Spring. 3 credits. Prerequisite: permission of instructor.
3 lecs.
An advanced version of OR&IE 580, intended for Ph.D.-level students.

OR&IE 728–729 Selected Topics in Applied Operations Research
Fall, spring. Credit to be arranged.
Current research topics dealing with applications of operations research.

OR&IE 738–739 Selected Topics in Mathematical Programming
Fall, spring. Credit to be arranged.
Current research topics in mathematical programming.

OR&IE 768–769 Selected Topics in Applied Probability
Fall, spring. Credit to be arranged.
Topics are chosen from current literature and research areas of the staff.

OR&IE 778–779 Selected Topics in Applied Statistics
Fall, spring. Credit to be arranged.
Topics chosen from current literature and research of the staff.

OR&IE 790 Special Investigations
Fall, spring. Credit to be arranged.
For individuals or small groups. Study of special topics or problems.

OR&IE 799 Thesis Research
Fall, spring. Credit to be arranged.
For individuals doing thesis research for master's or doctoral degrees.

OR&IE 891 Operations Research Graduate Colloquium
Fall, spring. 1 credit.
A weekly 1-1/2 hour meeting devoted to presentations by distinguished visitors, by faculty members, and by advanced graduate students on topics of current research in the field of operations research.

OR&IE 893–894 Applied OR&IE Colloquium (894 also M&AE 594)
893, fall; 894, spring. 1 credit each term.
A weekly meeting for Master of Engineering students. Discussion of various topics on manufacturing with faculty members and outside speakers.

THEORETICAL AND APPLIED MECHANICS

Basics in Engineering Mathematics and Mechanics

T&AM 123 Sensors and Actuators (also Engr 123)
Fall. 3 credits.
2 lecs, 1 lab.
For description see Engineering Common Courses.

T&AM 181 Structures and Machines in Urban Society (also Engr 181)
Fall. 3 credits.
R. Lance.
For description see Engineering Common Courses.

T&AM 202 Mechanics of Solids (also ENGRD 202)
Fall, spring. 3 credits. Prerequisite: coregistration in Mathematics 293.
2 lecs, 1 rec, 4 labs each semester, evening exams.
For description see Engineering Common Courses.

T&AM 203 Dynamics (also ENGRD 203)
Fall, spring. 3 credits. Prerequisite: coregistration in Mathematics 294.
2 lecs, 1 rec, 4 labs each semester, evening exams.
For description see Engineering Common Courses.

Engineering Mathematics

T&AM 191 Calculus for Engineers (also Mathematics 191)
Fall. 4 credits. Prerequisite: 3 years of high school math, including trigonometry.
3 lecs, 2 recs, evening exams. R. H. Rand and L. B. Wahlbin.
Differential calculus; introduction to integration and applications.

T&AM 192 Calculus for Engineers (also Mathematics 192)
Fall, spring, or summer. 4 credits. Prerequisite: Mathematics/T&AM 191.
3 lecs, 2 recs, evening exams. R. H. Rand and L. B. Wahlbin.
Methods of integration, hyperbolic functions, polar coordinates, infinite series, complex numbers, introduction to partial derivatives, introduction to surface and volume integrals.

T&AM 293 Engineering Mathematics
Fall, spring. 4 credits. Prerequisite: Mathematics/T&AM 192 or Mathematics 194.
2 lecs, 1 rec, 4 labs each semester, evening exams.
Partial derivatives and multiple integrals; first- and second-order differential equations with applications in the physical and engineering sciences. Includes microcomputer experiments using computer algebra to solve problems.

T&AM 294 Engineering Mathematics
Fall, spring. 4 credits. Prerequisite: Mathematics/T&AM 293.
2 lecs, 1 rec, 4 labs each semester, evening exams.
Vector spaces and linear algebra, matrices, eigenvalue problems, and applications to systems to linear differential equations. Vector calculus. Boundary-value problems and introduction to Fourier series. Includes microcomputer experiments using computer algebra to solve problems.

T&AM 310 Advanced Engineering Analysis I
Fall, spring. 3 credits. Prerequisite: Mathematics 294 or equivalent.
2 lecs, 1 rec.
Ordinary differential equations as applied in engineering context. Analytical and numerical methods. Special functions, initial value, boundary value, and eigenvalue problems in linear partial differential equations; introduction to nonlinear ordinary differential equations. Use of computer algebra and MACSYMA to solve problems.

T&AM 311 Advanced Engineering Analysis II
Spring. 3 credits. Prerequisite: T&AM 310 or equivalent.
Functions of several variables, introduction to complex variables, analytic functions, conformal mapping, method of residues. Application to the solution of Laplace's equation, and transform inversion techniques. Examples drawn from fluid mechanics, heat transfer, electromagnetics, and elasticity.

T&AM 610 Methods of Applied Mathematics I
Fall. 3 credits. Intended for beginning graduate students in engineering and science. An intensive course, requiring more time than is normally available to undergraduates (see T&AM 310–311) but open to exceptional undergraduates with permission of instructor.
3 lecs.
Emphasis is on applications. Linear algebra, calculus of several variables, vector analysis, series, ordinary differential equations, complex variables.

T&AM 611 Methods of Applied Mathematics II
Spring. 3 credits. Prerequisite: T&AM 610 or equivalent.
3 lecs.
Emphasis on applications. Partial differential equations, transform techniques, tensor analysis, calculus of variations.

T&AM 612 Methods of Applied Mathematics III
Fall. 3 credits. Prerequisite: T&AM 610 or 611 or equivalent. First of a 6-credit sequence (T&AM 612 and 613) that develops advanced mathematical techniques for engineers and applied physicists.
Review of complex variable theory, conformal mapping, special functions, integral transform, Wiener-Hopf technique, and singular integral equations. Problems drawn from electromagnetics, elasticity, fluid mechanics, heat transfer, and acoustics.

T&AM 613 Methods of Applied Mathematics IV
Spring. 3 credits. Prerequisite: T&AM 612 or equivalent.
Topics include asymptotic behavior of solutions of linear and nonlinear ODE (e.g., the WKB and multiple-scale methods), asymptotic expansion of integrals (method of steepest descent, stationary phase and Laplace methods). Regular and singular perturbation methods for PDE (e.g., method of composite expansions). Other topics (depending on instructor) may include normal forms, center manifolds, Liapunov-Schmidt reductors, Stokes phenomenon. The course may also include computer algebra (MACSYMA) exercises at the option of the instructor.

T&AM 614 Topics in Applied Mathematics V
Fall. 3 credits. Prerequisites: T&AM 610–613 or equivalent. Offered alternate years. First offering: Fall, 1992. Topic: Nonlinear waves. Topics such as nonlinear wave motion, bifurcation theory, or computer algebra will be covered, depending on the instructor and student interest.

T&AM 615 Topics in Applied Mathematics VI
Spring. 3 credits. Prerequisites: T&AM 610–613 or equivalent. Offered alternate years. See T&AM 613 for description.

Continuum Mechanics

T&AM 501 Topics in Composites I
Fall. 1 to 3 credits (1 credit each topical minicourse)

Analysis of Composite Structures (T. J. Healey)

Linear analysis of thin structural members possessing anisotropic material properties relevant to a composite. Focus on analysis, rather than on modeling or design. Topics include: (1) analysis of rodes, beams, and sandwich beams; (2) analysis of thin, orthotropic plates; and (3) analysis of thin orthotropic cylindrical shells. Grading may be based on homework and a short final examination.

Biological Composites I (J. T. Jenkins)

Overview of the microstructural features and the origin of mechanical properties of bone

and soft tissues, such as tendon, ligament, muscle, and skin, and outline of their use as structural components. Survey of design principles for composite materials that mimic those found in biological systems. Final grade determined by the student's in-class presentation on a relevant topic.

Design Principles for Composite Structures (R. H. Lance)

A review of thermo-mechanical behavior of anisotropic, orthotropic, and transversely isotropic materials. Includes development of pertinent equations for laminated materials and sandwich structures. Application is made to the design and analysis of rods, beams, tubs, and plates. Examples drawn from space structures.

Mechanical Testing of Composite Constituents (Staff)

Focuses on the theoretical and experimental characterization of strength and life of advanced composite constituents and materials. Reviews test methods, specimen preparation, testing, data reduction, and analysis. Perform laboratory experiments to determine short-term strength distribution of fiber material, and the evaluation of interface and life strength.

Reliability Models for Composites (S. L. Phoenix)

Surveys statistical models for the strength of fibers, fiber bundles, and composites with emphasis on reliability assessment. Features include the roles of the Weibull distribution, size effects, and the micromechanics of stress transfer around fiber breaks. Time-dependent failure in fatigue is considered as an extension involving matrix creep and interface debonding. Grades are based on several homework tasks.

Fracture Testing for Composites (A. Zehnder)

Surveys basic concepts of fracture mechanics and fracture mechanics models for fiber-reinforced composites. Covers in detail fracture models for chopped-fiber reinforced plastics, unidirectional composites, and laminates. Evaluation of performance of simple fracture-test procedures based on standardized test methods, as well as advanced experimental mechanics techniques. Grades determined by students' work in three laboratory sessions dealing with fracture testing.

T&AM 502 Topics in Composites II
Fall. 1 to 3 credits (1 credit each topical minicourse)

Interface Failure and Fracture Processes in Composites (H. Hui)

Focuses on interfaces in composites. Topics include: (1) the interface and its role in fracture toughness and stiffness reduction in composites, (2) "interface strength" testing methods, and (3) introduction to interface fracture methods. Grade based on homework and short final examination.

Boundary-Element Methods for Composites (S. Mukherjee)

Surveys finite-element and boundary-element methods for solving a number of anisotropic elasticity problems with applications to composites. Topics include: (1) characteristics of FEM and BEM methods, and (2) application of FEM and BEM methods to solve a number of problems in composite materials. Grade based on a short final examination.

Software for Composite Design (Staff)

Fundamentals of designing with composite materials. Learn to perform a stress analysis to design an orthopedic lamina using classical laminated plate theory. Use software to analyze and design composite structures. Features of the software include: combined stresses, multiple loading conditions, and laminated design based on selected failure criterion. Perform stress analysis of laminates, laminate design by ranking and the micro/macro analysis of composites. Applications include: design of composite tubes, pressure vessels, beams, plates, and space structures. Grades based on short design project, class participation, and presentation of a project in class.

Effective Properties of Composites (P. Rosakis)

Review of material anisotropy. Field equations and interface conditions for composite bodies. Solutions of fundamental composite problems. Eshelby's inhomogeneity problem. Self-consistent methods for computing effective moduli. Layered media. Periodic arrays of particles. Introduction to basic concepts of homogenization theory.

Biological Composites II (A. Ruina)

Plant evolution has led to structural materials that perform well structurally outside of their natural environment. Wood is the primary example to be discussed. Natural fibers (e.g., flax) that can be used in artificial composites will also be considered. Focus on mechanical properties. Lectures, readings, demonstrations, and homework exercises.

Nondestructive Testing of Composites (W. Sachse)

Overview of nondestructive testing techniques that are used to monitor composite material-fabrication procedures to determine the mechanical properties of composite specimens and to assess the integrity of composite structural components. A survey of current NDT research. Topics include (1) goals and problems of NDT/NDE measurements in composites, (2) survey of NDT technologies applicable to measurements in composites, (3) active (UT) and passive (AE) ultrasonic NDT measurements in composite materials, and (4) developments and directions of NDT research applicable to composite materials evaluation. Grade based on laboratory work and a written response to a specific composite NDT problem.

T&AM 555 Introduction to Composite Materials (also M&AE 555)
Fall. 4 credits.
R. H. Lance.
Introduction to composite materials: varieties of reinforcements, matrix materials, and their properties. Mechanics and failure analysis of lamina, laminates, and wound structures. Introduction to micromechanics theories of composites, manufacturing methods, fabrication and assembly techniques, composite applications, environmental effects.

[T&AM 569 Sensors
Fall. 3 credits. Not offered 1992–93.
3 lecs a week, 4 labs a semester.
This course deals with the general properties of sensors and actuators used in measurement and process-control applications involving thermal and mechanical quantities. Considered are sensors and actuators based on a broad range of physical transduction phenomena. Attention is given to the development of sensor models and criteria for evaluating the general performance characteristics of a sensor, including its transduction characteristics and its measurement field. Also studied are algorithms for processing sensor signals to recover the characteristics of the sensor or to remove its effect in a specific measurement application. An integral part of the course is the Sensors Laboratory, which provides students with hands-on opportunities for measuring the characteristics and operational parameters of a broad range of thermo-mechanical sensors.]

T&AM 591 Master of Engineering Design Project I
Fall. 3–5 credits.
Staff.
M. Eng. (Mechanics) project related to the mechanics of advanced composites and structures.

T&AM 592 Master of Engineering Design Project II
Spring. 5–10 credits.
M. Eng. (Mechanics) project related to the mechanics of advanced composites and structures.

T&AM 655 Advanced Composite Materials and Structures (also M&AE 655)
Spring. 4 credits.
Advanced mechanics of composite materials. Strength theory of continuous- and discontinuous-reinforced composites. Micromechanics, interface mechanics, modes of failure, creep rupture. Mechanics of strcutural components. Design and analysis of composite structures: pressure vessels, aerospace structures, thick composites, and plates. Adhesive bonding and mechanical fastening. Dynamic effects and hygrothermal effects.

T&AM 663 Solid Mechanics I
Fall. 4 credits.
Rigorous introduction to small-strain solid mechanics with emphasis on linear elasticity; stress, strain, tensors, balance laws, energy principles, general theory of linear elasticity, and solutions of elementary boundary-value problems.

T&AM 664 Solid Mechanics II
Spring. 4 credits. Prerequisites: Mathematics 610 and T&AM 663, or equivalent.
3 lecs, 1 lab.
Preparation for advanced courses in solid mechanics. Singular solutions in linear elasticity, large deformations, nonlinear elasticity, linear visco-elasticity, mechanics of defects (cracks and dislocations), classical plasticity, and constitutive relations.

[T&AM 751 Continuum Mechanics and Thermodynamics
Fall. 3 credits. Prerequisites: T&AM 610 and 611; and 663 and 664 or equivalents. Offered alternate years. Not offered 1992–93.
3 lecs. T. Healey.
Kinematics, conservation laws, the entropy inequality, constitutive equations, frame indifference, material symmetry. Rate-dependent materials and materials with internal variables.]

T&AM 752 Nonlinear Elasticity
Fall. 3 credits. Prerequisites: T&AM 610 and 611; and 663 and 664 or equivalents. Offered alternate years.
3 lecs.

Review of kinematics and constitutive theory appropriate for large deformations of nonlinearly elastic bodies. The basic field equations of nonlinear elastostatics and elastodynamics. Exact solutions of special problems. Linearization and stability. Nonlinear theories of thin structural members and their relationship to the three-dimensional theory. Introduction to static bifurcation theory with applications to strings, rods, plates, and shells.

T&AM 753 Fracture
Spring. 3 credits. Prerequisites: T&AM 610 or 611; and 663 and 664 or equivalents. Offered alternate years.
3 lecs.
Topics will be selected from (1) elastic fracture mechanics: K, small-scale yielding, solutions of elastic crack problems; (2) nonlinear rate-independent, small-deformation fracture mechanics: plastic fracture, J-integral, small-scale yielding; (3) rate-dependent fracture mechanics: dynamic fracture, creep fracture; (4) mechanics of failure in polymers, ceramics, composites, and metals: void growth, load transfer between fibers, crazing.

[T&AM 757 Inelasticity
Spring. 3 credits. Prerequisites: T&AM 610 and 611; and 663 and 664 or equivalents. Offered alternate years. Not offered 1992–93.
3 lecs.
Inelasticity; plasticity, visco-elasticity, and modern nonlinear theories. Plasticity: general principles, limit analysis, and boundary value problems. Visco-elasticity: general principles and solution of boundary value problems. Modern state variable theories: their relation to classical theories, their phenomenology, and use in solving boundary value problems.]

T&AM 759 Computational Methods
Fall. 4 credits. Prerequisites: T&AM 610 and 611; and 663 and 664 or equivalents. Offered alternate years
3 lecs.
The aim of this course is to survey a wide range of applications of the boundary element method (BEM) and finite element method (FEM) in solid mechanics. The boundary element method will be introduced and then be used in problems in linear elasticity, diffusion, wave propagation, and problems with material and/or geometric nonlinearities. Finite-element applications will emphasize nonlinear problems in solid mechanics.

[T&AM 768 Elastic Waves
Fall. 3 credits. Prerequisites: T&AM 610 or 611; and 663 and 574 or equivalents. Offered alternate years. Not offered 1992–93.
3 lecs.
An advanced course on dynamic stress analysis and wave propagation in elastic solids. Theory of elastodynamics. Waves in isotropic and anisotropic media. Reflection and refraction. Surface waves and waves in layered media. Transient waves and methods of Lamb-Cagniard-Pakeris. Thick-plate theories. Vibration of spheres. Scattering of waves and dynamic stress concentration.]

Dynamics and Space Mechanics

T&AM 570 Intermediate Dynamics (also M&AE 570)
Fall. 3 credits.
2 lecs.
Oscillations and one- and two-degree-of-freedom vibrating systems. General properties of vibrating systems. Modal analysis. Vibration of continuous systems. Elementary nonlinear systems and chaos. Characterization of vibrating systems. Measurements and applications.

T&AM 574 Vibrations and Waves in Elastic Systems (also M&AE 577)
Spring. 4 credits. Prerequisites: T&AM 570 and 610.
3 lecs, 1 lab.
Dynamics of elastic continua, including strings, membranes, and beams. Hamilton's principle, balance laws, characteristics, dispersion, phase, and group velocities.

T&AM 671 Advanced Dynamics
Spring. 3 credits. Prerequisite: T&AM 570 or equivalent. Offered alternate years.
Review of Lagrangian mechanics; Hamilton's principle, the principle of least action, and related topics from the calculus of variations; Hamilton's canonical equations; approximate methods for two-degrees-of-freedom systems (Lie transforms); canonical transformations and Hamilton-Jacobi theory; KAM theory.

[T&AM 672 Celestial Mechanics (also Astronomy 579)
Spring. 3 credits. Offered alternate years. Not offered 1992–93.
Two 1 1/4-hour lecs.
Description of orbits; 2-body, 3-body, and n-body problems; Hill curves, libration points and their stability; capture problems; virial theorem. Osculating elements, perturbation equations; effects of gravitational potentials, atmospheric drag, and solar radiation forces on satellite orbits; secular perturbations, resonances, mechanics of planetary rings.]

T&AM 673 Mechanics of the Solar System (also Astronomy 571)
Spring. 3 credits. Prerequisite: an undergraduate course in dynamics. Offered alternate years.
Two 1-1/4-hour lecs.
Gravitational potentials, planetary gravity fields. Free and forced rotations. Chandler wobble, polar wander, damping of nutation. Equilibrium tidal theory, tidal heating. Orbital evolution of natural satellites, resonances, spin-orbit coupling, Cassini states. Long-term variations in planetary orbits. Dust dynamics. Dynamics of ring systems. Physics of interiors, seismic waves, free oscillations. Illustrative examples are drawn from contemporary research.

[T&AM 675 Nonlinear Vibrations
Fall. 3 credits. Prerequisite: T&AM 574 or equivalent. Offered alternate years. Not offered 1992–93.
Review of linear systems, free and forced vibrations. Nonlinear systems, phase plane methods, method of isoclines. Conservative systems. General autonomous systems, equilibrium and periodic solutions, linearization and Lyapunov stability criteria, Poincaré-Bendixson theorem. Quantitative analysis of weakly nonlinear systems in free and forced vibrations, perturbation methods, Krylov-Bogoliubov method. Applications to problems in mechanics.]

T&AM 776 Applied Dynamical Systems (also Math 776)
Fall. 3 credits. Suggested prerequisite: T&AM 675, Mathematics 517, or equivalent. Offered alternate years.
Review of planar (single–degree-of-freedom) systems. Local and global analysis. Structural stability and bifurcations in planar systems. Center manifolds and normal forms. The averaging theorem and perturbation methods. Melnikov's method. Discrete dynamical systems, maps and difference equations, homoclinic and heteroclinic motions, the Smale Horseshoe and other complex invariant sets. Global bifurcations, strange attractors and chaos in free and forced oscillator equations. Applications to problems in solid and fluid mechanics.

Special Courses, Projects, and Thesis Research

T&AM 491–492 Project in Engineering Science
491, fall; 492, spring. 1–4 credits, as arranged. Projects for undergraduates under the guidance of a faculty member.

T&AM 796–800 Topics in Theoretical and Applied Mechanics
Fall, spring. 1–3 credits, as arranged. Special lectures or seminars on subjects of current interest. Topics are announced when the course is offered.

T&AM 890 Master's Degree Research in Theoretical and Applied Mechanics
Fall, spring. 1–15 credits, as arranged. S-U grades optional.
Thesis or independent research at the M.S. level on a subject of theoretical and applied mechanics. Research is under the guidance of a faculty member.

T&AM 990 Doctoral Research in Theoretical and Applied Mechanics
Fall, spring. 1–15 credits, as arranged. S-U grades optional.
Thesis or independent research at the Ph.D. level on a subject of theoretical and applied mechanics. Research is under the guidance of a faculty member.

FACULTY ROSTER

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GRADUATE SCHOOL

Alison P. Casarett, dean

Eleanor S. Reynolds, associate dean

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Programs leading to the degrees of Doctor of Law (J.D.), Doctor of Medicine (M.D.), Doctor of Veterinary Medicine (D.V.M.), and Master of Business Administration (M.B.A.) are not administered by the Graduate School. Information on those programs can be obtained from the Law School, the Medical College (New York City), the College of Veterinary Medicine, and the Johnson Graduate School of Management respectively.

GRADUATE SCHOOL

The graduate program at Cornell permits an unusual degree of accommodation to the needs and interests of the individual student. Degree requirements are kept to a minimum. There are no specific course or credit requirements for the advanced general degrees of Master of Arts, Master of Science, and Doctor of Philosophy, but only such general requirements that best accomplish the aim of graduate study: a period of study in residence, the mastery of one subject, adequate knowledge of allied subjects, oral examinations to establish competency for presentation of a dissertation or thesis, and a satisfactory dissertation or thesis. Certain advanced professional degree programs have specific course or credit requirements that are determined by the faculty of the professional school or college in which the degrees are offered.

A close working relationship between the student and faculty members is essential to the graduate program at Cornell. Under the Special Committee system the student is guided by, and works with, at least two or three faculty members chosen by the student to represent his or her major and minor subjects. The major subject representative is the chair of the Special Committee and usually has the primary responsibility for directing the student's thesis or dissertation research.

Students who want to use the university's facilities for intensive specialized training only and who do not want to become degree candidates may apply for admission as non-degree students.

REQUIREMENTS FOR ADMISSION

To be admitted to the Graduate School, an applicant should:

1) hold a baccalaureate degree or its equivalent, granted by a faculty or university of recognized standing;
2) have adequate preparation for graduate study in the chosen field of instruction;
3) have fluent command of the English language;
4) present evidence of promise in advanced study and research; and
5) take the Graduate Record Examinations General Test for those fields that require the GREs.

Before admission can be final, all applicants whose native language is not English must provide proof of competency in the English language. Acceptable proof could be

1) a Test of English as a Foreign Language (TOEFL) score of 550 or higher;
2) a degree from a college or university in a country where the native language is English; or
3) two or more years of study in an undergraduate or graduate program in a country where the native language is English.

Information on times and places for the TOEFL examination and Graduate Record Examinations and application forms may be obtained from the Educational Testing Service, Princeton, New Jersey 08541, U.S.A.

Applications for admission to the Graduate School may be submitted at any time during the year. Many fields, however, require that applicants for fall admission submit their completed applications by January 10.

Applicants who are also applying for Cornell Graduate School fellowship consideration *must* submit their completed applications and supporting credentials by January 10.

Inquiries regarding admission and fellowships should be addressed to the Graduate School Admissions Office, Cornell University, Sage Graduate Center, Ithaca, New York 14853-6201.

Information concerning admission requirements and courses of study for degrees not administered by the Graduate School may be obtained from the several schools and colleges that administer them (see "Administration," above).

Inquiries regarding facilities for advanced study and research in a given field, special requirements for such study and research, and opportunities for teaching and research assistantships should be addressed to the graduate faculty representative in the particular field.

More detailed information may be obtained from the following publications: the *Graduate School Catalog, 1991–93*, available from Cornell University Catalogs, 122 Maple Avenue, Ithaca, NY 14850-4902, and the application *Graduate Study at Cornell University*, available from the Graduate School, Cornell University, Sage Graduate Center, Ithaca, New York 14853-6201.

SCHOOL OF HOTEL ADMINISTRATION

ADMINISTRATION

David A. Dittman, dean

Michael H. Redlin, associate dean for academic affairs

Susanne DeGraba, assistant dean for finance and administration

William N. Chernish, assistant dean for executive education

E. Howland Swift, assistant dean for external affairs

James E. Hisle, managing director of the Statler Hotel and J. Willard Marriott Executive Education Center

Cheryl S. Farrell, director of student services

Yariela Kerr, director of minority student programs

A. Neal Geller, graduate faculty representative

Sandra K. Boothe, director of the M.P.S. program

Norman E. Gustafson, director of information technology

Katherine S. Laurence, director of academic information resources and training

Jim Dunston, director of the Binenkorb Computer Center

Fred H. Antil, director of career services

Harry R. Keller, director of alumni affairs

Glenn Withiam, executive editor of the *Cornell Hotel and Restaurant Administration Quarterly*

DEGREE PROGRAMS

	Degree
Hotel and Restaurant Administration	
	B.S.
	M.P.S.
	M.S.
	Ph.D.

FACILITIES

Statler Hall. Statler Hall is a unique building designed expressly to meet the needs of the faculty and students of the School of Hotel Administration. The totally renovated building, which serves both practical and theoretical instruction, houses classrooms, lecture rooms, laboratories, a library, a video and computer center, a beverage-management center, an auditorium, and the Statler Hotel and J. Willard Marriott Executive Education Center. Statler Hall and the Statler Hotel were designed expressly for the school's academic and executive-education programs, providing students with training and work experience in facilities similar to those in which they will work after graduation.

The School of Hotel Administration Library has the largest single collection of hospitality-related materials in the United States. The collection contains approximately 25,000 volumes, 2,000 videotapes, numerous ephemera and memorabilia (such as photographs, menus, and rare books), and more than 1,200 serial subscriptions. Materials on lodging, foodservice, travel and tourism, and general business topics comprise the core of the library's collections. Among the library's special features are numerous computerized information resources, including *The Hospitality Database*, an extensive and unique (one of only four in America) index to hospitality articles. Information resources and services for industry are available through the library's HOSTLINE service.

Statler Hotel and J. Willard Marriott Executive Education Center. The Statler Hotel comprises 150 guest rooms, an executive-education center, restaurants, lounges, and the university's faculty and staff club. It is an industry showcase, one that demonstrates the very finest in hospitality and hospitality-education practices. The Statler is an independent, self-sustaining teaching hotel that provides quality food, beverage, meeting, and lodging services to the Cornell community and campus visitors, including parents and those who visit Cornell as part of the application process. In addition, the hotel is a practice-management facility for certain classes, internships, and independent-study projects. It offers part-time jobs to approximately 200 students each semester with preference given to students in the hotel school.

UNDERGRADUATE CURRICULUM

The School of Hotel Administration offers education in the numerous disciplines required for modern management, including accounting, finance, marketing, operations, communication, properties management, information technology, law, and human resources management. The school's graduates hold executive positions in a variety of industries, but are especially well represented in the management of hospitality-related enterprises, including the lodging, food service, and travel industries.

Students are encouraged to pursue a broad range of courses, including those in the humanities, social sciences, and natural sciences, as preparation for assuming positions in the business community. Included in the basic curriculum are courses in management, human resources, financial management, food and beverage operations, marketing, tourism, properties management, communications, and law.

The basic program leading to the undergraduate degree in hotel administration, as set forth below, is enriched by a broad selection of free and distributive elective courses offered by the school and elsewhere in the university. For more complete information about undergraduate program requirements, see the school's admissions catalog or course supplement (available in room 174 Statler Hall).

Requirements for Graduation

Regularly enrolled students in the School of Hotel Administration are candidates for the degree of Bachelor of Science. The requirements for that degree are:

1) completion of eight terms in residence for those who entered as freshmen; terms of residence for transfer students are determined by the amount of transfer credit awarded;
2) completion, with a minimum cumulative grade-point average of 2.0 (including a grade-point average of 2.0 in the final semester), of 120 required and elective credits, as set forth in the table on the following page;
3) completion of two units of practice credit prior to the last term of residence, as defined on the following page;
4) completion of the university requirement in physical education.

Suggested course programs appear on the following pages. The core courses account for 64 of the 120 credits needed for graduation, the selected concentration accounts for 12 credits, and 18 credits are allotted for distributive electives. The remaining 26 credits may be earned in courses chosen from the offerings of any college of the university, provided that the customary requirements for admission to such courses are met.

Students in the School of Hotel Administration who plan to attend summer school at Cornell or elsewhere or who propose to attend any other university, with the expectation that the credit earned will be counted toward the Cornell degree in hotel administration, must obtain the approval of the school in advance. Without advance approval, such credit may not count toward the degree.

Credit earned in military science, aerospace studies, or naval-science courses may be counted in the 26-credit group of free electives.

Transfer Credit Policy

Transfer students are required to complete all degree requirements with at least seventy-five (75) credits at Cornell University, of which a minimum of sixty (60) must be in courses offered by the Hotel School, and nine (9) must be in distributive electives taken outside the Hotel School. Thus, a maximum of forty-five (45) hours in transfer credit may be allowed from other accredited colleges or universities, as follows:

Core	13
Concentration	0
Distributive Electives	9
Free Electives	23
	45

In the core, transfer credit may be allowed against basic courses only (for example, HA 103, HA 136, HA 225, Economics). Others (including HA 243 and HA 174) may be waived, and an upper-level course in the area would be substituted. For instance, if HA 243 were waived, another marketing course would be required in its place. The communication courses (HA 164 and HA 365) are tailored specifically to the School of Hotel Administration, and, thus, communication courses taken elsewhere are not accepted against core courses.

Concentration courses may not transfer without the express written consent of the faculty in the area concerned. While such consent is rare, it is not impossible.

Distributive electives ensure that Hotel students are exposed to other courses at Cornell, and, thus, only nine (9) credits may transfer. The remaining nine (9) must be taken at Cornell but may be distributed in any combination of humanities, social sciences, or natural sciences provided at least three (3) credits are taken (at Cornell or transferred from elsewhere) in each area.

Twenty-three (23) hours in free electives may transfer.

Concentration

While completing the required courses leading to the bachelor's degree, undergraduates in the school also must select a concentration: 12 elective credits in a major area of the core curriculum or, with the support of a faculty member, self-directed.

When students select their major fields of concentration, they should consult the coordinator of instruction in that area during the sophomore year to plan the sequence of elective courses that will best fit their program.

Foreign Languages

Mastery of a foreign language is particularly desirable for students who are planning careers in the hospitality industry. Foreign language study at Cornell is characterized by small classes and emphasis is on the spoken language. Students supplement their course work with study in a well-equipped language laboratory.

Further information on foreign language courses at Cornell, and placement in language courses, may be found in this book in the College of Arts and Sciences program description under the Modern Languages, Literature, and Linguistics section and also under the section Advanced Placement for Freshmen.

Independent Study

Students may conduct independent study projects in any academic area of the school under the direction of a faculty member. Credit is arranged on an individual basis. To enroll in an independent study project, students must obtain written permission from the school before course enrollment

Practice-Credit Requirement

As part of degree requirements, undergraduates enrolled in the School of Hotel Administration must fulfill the practice-credit requirement and submit verification thereof prior to registering for the last semester.

Further details are set forth in the *Practice Credit Handbook for Undergraduates in the School of Hotel Administration*, available in the school's Office of Career Planning and Placement, room 153 Statler Hall.

Management-Intern Program

This program is open only to upperclass students. Students accepted into the program earn 12 credits which generally are applied as free electives. Students enrolled in this program have an opportunity to combine managerial readings and previous course work with challenging work experience. Management-intern positions are available at many locations worldwide, including several on the Cornell campus. Students receive both academic credit and practice credit, and appropriate financial remuneration for the period of the program. Application for admission should be made one semester in advance. Guidance is provided by school staff members under the direction of a faculty chairman.

Study Abroad

Programs providing an opportunity to study in a foreign country and develop an awareness of the international component of the hospitality industry can contribute to each student's total educational experience. Students in recent years have studied in Italy, Spain, France, and England. Information on the many study-abroad programs operating during the summer and academic year is available at the Cornell Abroad Office (in Uris Hall).

Students should discuss their plans with the school's study-abroad faculty representative so that all petition and credit-evaluation procedures are followed.

Grading System

Letter grades ranging from A+ to F are given to indicate academic performance in each course. These letter grades are assigned a numerical value for each term average as follows: A is equivalent to 4.0; B to 3.0; C to 2.0; D to 1.0; F to 0. For good standing, the student must maintain a minimum average of 2.0. Of the free-elective courses, a maximum of 4 credits each term may be taken on a "satisfactory-unsatisfactory" (S-U) basis. Students should be aware that a satisfactory grade equals "C-" or above and an unsatisfactory grade equals "D+" or lower.

Students whose term averages are at least 3.3 and who took at least 12 credits of letter grades with no unsatisfactory or incomplete grades are honored by being placed on the Dean's List.

Course Requirements for Graduation

Required courses	*Credits*
Management Operations: Hotel Administration 103, 303	6
Human-Resources Management: Hotel Administration 211, 212	6
Financial Management: Hotel Administration 225, 226, 325	10
Food and Beverage Management: Hotel Administration 136, 236, 335	12
Marketing and Tourism: Hotel Administration 243	3
Properties Management: Hotel Administration 255, 355	6
Communication: Hotel Administration 165, 365	6
Information Technology: Hotel Administration 174	3
Law: Hotel Administration 387	3
Quantitative Methods: Hotel Administration 191	3
Economics: Micro and Macro	6
Specifically required credits	64
Concentration	12
Distributive electives	18
Free electives	26
Total credits required for graduation	120

Typical Course Sequences

The following arrangements of courses tend to be more fixed in the freshman and sophomore years, with a greater degree of flexibility characterizing the upperclass years.

Freshman Year

Typically, a freshman schedule will consist of 14 to 16 credits each term, to include the following:

Required courses	*Credits*
H Adm 103, Principles of Management	3
H Adm 136, Food and Beverage Management	4
H Adm 165, Managerial Communication: Writing Principles and Process	3
H Adm 174, Microcomputing	3
H Adm 191, Quantitative Methods	3
Microeconomics	3
Macroeconomics	3
Distributive electives	6
Free electives	0–4
	28–32

Sophomore Year

Required courses	*Credits*
H Adm 211, Human-Resources Management	3
H Adm 212, Human Relations Skills	3
H Adm 225, Financial Accounting	3
H Adm 226, Financial Management	4
H Adm 236, Culinary Theory and Practice	4
H Adm 243, Principles of Marketing	3
H Adm 255, Hotel Development and Planning	3
Distributive electives	3–6
Free electives	3–6
	29–35

Junior Year

Required courses	*Credits*
H Adm 303, Organizational Processes and Design	3
H Adm 325, Hospitality Financial Management	3
H Adm 335, Restaurant Management	4
H Adm 355, Hospitality Facilities Operations	3
H Adm 365, Managerial Communication: Principles and Practices	3
H Adm 387, Business and Hospitality Law	3
Concentration	6
Free electives	3–6
	28–31

Senior Year

Required courses	*Credits*
Concentration	6
Free electives	18–26
	24–32

GRADUATE CURRICULUM

The school's programs for advanced degrees include those of Master of Professional Studies, Master of Science, and Doctor of Philosophy. For further information on graduate programs, consult the school's graduate catalog (available in room 172 Statler Hall); contact Professor A. Neal Geller, the school's graduate faculty representative, Sandra K. Boothe, M.P.S. Director, or see the university's *Announcement* from the Graduate School.

Candidates for the Master of Science or Doctor of Philosophy degrees should refer to the admission and degree requirements set forth in the *Announcement.* The student's program is developed with the aid and direction of a special committee chosen by the student from members of the Graduate Faculty. This committee also approves the thesis or dissertation project.

Candidates for the Master of Professional Studies (M.P.S.) degree pursue one of four tracks in their graduate studies. Students whose undergraduate degrees are in areas other than hotel administration follow track I, for which the required two-year program is set forth below.

The curricula for M.P.S. tracks II and III are specifically designed for each student, based on previous experience and career goals. Students who hold four-year degrees in hotel administration from an institution other than Cornell qualify for the track II curriculum. A minimum of three residence units and 48 credits are required to complete track II. Track II students must take 12 credits in a concentration, 6 credits of monograph, 16 elective credits, and any required courses not yet completed prior to their arrival.

Track III is for students who hold a Bachelor of Science degree in hotel administration from Cornell. Two residence units and 32 credits are required to complete track III. Track III students must take 12 credits in a concentration, 6 credits of required courses, 6 credits of monograph, and 8 elective credits.

Track IV is for students who hold a master's degree and have no prior degrees in hotel administration. Three residence units and a minimum of 48 credits are required. Track IV students must take 12 credits in a concentration, 6 credits of monograph, any required courses not exempted, prerequisites, and enough elective credits to complete the 48-credit minimum.

All students are required to designate an area of concentration before their next-to-last term.

Each student also writes an investigative report or monograph, under the guidance of an adviser, to meet requirements for the M.P.S. degree.

Required Program for M.P.S. Track I Students

Required courses	*Credit*
H Adm 705, Management Strategy for the Hospitality Industry	3
H Adm 718, Advanced Human Resources Management	3
H Adm 725, Graduate Managerial Accounting in the Hospitality Industry	3
H Adm 726, Graduate Corporate Finance	3
H Adm 731, Graduate Food and Beverage Management	3
H Adm 732, Graduate Restaurant Management	3
H Adm 741, Graduate Marketing Management	3
H Adm 751, Advanced Project Development and Construction	3
H Adm 774, Information Systems for Hospitality Managers	3
H Adm 791, Graduate Quantitative Methods	3
H Adm 805, M.P.S. Monograph 1	3
H Adm 806, M.P.S. Monograph 2	3
Specifically required credits	36
Concentration credits	12
Free elective credits	16
Total credits required for M.P.S. Track I students	64

Course Schedule Information

For up-to-date information about course scheduling, and to obtain a course supplement, contact the hotel school student services office in room 178 Statler Hall, telephone 255-3076.

MANAGEMENT OPERATIONS COURSES

H ADM 100 Principles of Management
Fall. 3 credits. Limited to transfer, ITD, and non-hotel school students. Satisfies requirement for H Adm 103.
T R 12:20. P. Rainsford.
An introductory survey course in management with general reference toward the hospitality industry. The course is organized around the traditional management functions of planning, organizing, leading, and controlling. A major semester-long project will require students to plan and operate a business venture.

H ADM 102 Distinguished Management Lectures
Fall. 1 credit. Limited to hotel school students except by written permission. Elective.
F. 1:25. D. Dittman.
A series of lectures given by non-resident speakers prominent in the hotel and restaurant industries or allied fields. Topics include career ladders, company profiles, and business-policy formulation.

H ADM 103 Principles of Management
Fall. 3 credits. Limited to hotel school freshmen. Required.
T R 12:20. T. Cullen.
A systems approach to understanding the nature of management in the hotel and restaurant industries.

H ADM 203 Club Management
Fall or spring. Fall, second 7 weeks only; spring, first 7 weeks only. 2 credits. Fall, limited to 35 hotel school juniors and seniors; spring, open enrollment. Prerequisite for hotel students: H Adm 103. Elective.
M 1:25–4:25. R. James.
The study of private membership clubs and club administration. The application of current management principles in a not-for-profit environment is discussed and club management is compared to other areas of the hospitality industry. Topical coverage includes: tournament, facility, and recreation management; legal, financial, and legislative issues; human relations and resource consideration; marketing, pricing policies, and quality standards.

H ADM 303 Organizational Processes and Design
Fall or spring. 3 credits. Limited to juniors and seniors. Prerequisites: H Adm 103, 211, and 212. Required.
T R 11:55–1:10. C. Enz, C. Lundberg.
Focuses on the design and development of organizational systems, processes, and structures from a managerial perspective. Students will become familiar with alternative organizations through readings, case studies, and field experiences including, but not limited to, hospitality systems.

H ADM 304 Rooms-Division Management
Fall, second 7 weeks only. 2 credits. Prerequisite: H Adm 103. Elective.
F 1:25–4:25. S. Weisz, R. Chase.
An introductory course concentrating on the fundamentals of rooms-division management. Areas of concentration include front-desk operations and the reservations, housekeeping, and telephone departments. Particular emphasis on selling strategies, forecasting, rate efficiencies, labor management, and guest relations.

H ADM 305 Resort and Condominium Management
Fall. 3 credits. Not open to freshmen. Recommended: H Adm 387. Elective.
T R 11:55–1:10. M. Noden.
A lecture course in the operation of various types of resort hotels and condominiums. Emphasis is on the promotion of business, the provision of facilities, services, and guest entertainment. Contract and non-contract relationships with the travel industry, terminology, rental-pool agreements, S.E.C. regulations, state statutory requirements, developer-management-owner contracts, and relationships in condominiums are reviewed.

H ADM 306 Franchising in the Hospitality Industry
Spring, first 7 weeks only. 2 credits. Prerequisite: H Adm 225. Elective.
M 1:25–4:25. D. Whitehead.
Relationships between franchisor and franchisee, advantages and disadvantages of franchising, structure and services offered by franchisors. Case studies of leading lodging and restaurant companies currently offering franchises will be discussed. Guest speakers from the franchising industry.

H ADM 402 Hospitality Management Seminar
Fall. 1 credit. Limited to 20 seniors and graduate students. By permission of instructor only. Submit letter of interest to dean's office. Students will be expected to register for H Adm 102. Elective.
F 2:30. D. Dittman.
A weekly meeting with the H Adm 102 speaker of the week. The subject matter varies from week to week, depending on the area of expertise of the speaker. The class is relatively unstructured, and students are expected to ask questions and enter into discussion.

H ADM 404 Management Organization of the Small Business
Fall or spring. 3 credits. Limited to 20 juniors, seniors, and graduate students. Prerequisite: H Adm 325 or equivalent. Elective.
T 2:30–4:25; R 2:30. P. Rainsford.
Focuses on the entrepreneur and the decisions made in planning, financing, developing, and operating a new business venture. Case studies and guest speakers will be used. There will be one major term project, which will require the application of the course material to a field consulting project that will result in written and oral reports to the owner of the business and the Small Business Administration.

H ADM 405 Management Planning for the Hospitality Industry
Spring. 3 credits. Prerequisites: all required undergraduate courses at the 100, 200, and 300 levels. Elective.
T R 11:55–1:10. Faculty.
Examines how to make strategic decisions to determine the future direction and competitive positioning of a company. That process includes determination, formulation, implementation, and evaluation of strategy. Seminar format; case studies. Attendance requirements include five evening sessions during the last three weeks of class.

H ADM 406 Integrated Studies in the Hospitality Industry
Fall or spring. 3 credits. Limited to hotel school seniors. Three Tuesday-night meetings in lieu of examinations. Elective. Not offered spring 1993.
T R 2:30–3:45. R. Chase.
Employs text readings, participation in a simulation of an organization, and guest presentations to explore business missions, objectives, strategies, action plans, and evaluations. As an integrative, summary course, the areas of review and application will involve hotel and food service, marketing, organization, and finance. Student teams will make presentations of business plans to three chief executive officers serving as guest critics.

H ADM 407 Seminar in Hotel Operations
Spring. 3 credits. Limited to 30 seniors. Estimated cost of field trip, $200. Elective.
W 12:20; F 11:15–1:10. J. Clark.
Seminar course applies management theory to actual hotel operations via semester-long interactions and visits with the department heads and general manager of a medium-to-large-size hotel. Field trip includes attendance at executive committee meeting, presentations by various department heads, and half-day "shadow assignments."

H ADM 408 Casino Management
Fall or spring, first 7 weeks only. 2 credits. Limited to 45 students. Prerequisite: H Adm 325. Estimated cost of field trip, $150. Elective.
M 10:10–12:05. D. Whitehead.
Objectives are to develop an understanding of casino operations within a casino hotel and to develop knowledge of the communication network between the casino and all other departments of the hotel. A field trip to an Atlantic City casino is required.

H ADM 409 Airline Management
Spring. 3 credits. Limited to 25 seniors and graduate students. Prerequisites: H Adm 211 and 212. Elective.
T 2:30; R 2:30–4:25. M. Noden.
Focuses on the airline industry and explores both pre- and post-regulatory climates. Emphasis is on dynamic organizational change in response to fluctuating economic and legal conditions. Topics include airline organization, comparative corporate strategies, marketing and distribution networks, operations and service management, union relations, finance, government regulation, and air transport. Case studies and guest lecturers will provide additional insights into the dynamics of airline management. Using the computer-based management simulation called AIRLINE, student teams will manage a regional carrier.

H ADM 501 Creative Management for Organizational Change
Spring. 3 credits. Limited to 24 students. Elective.
W 1:25–3:55. F. Berger.
Through lectures, exercises, and group problem-solving sessions students will explore the characteristics of creative people and organizations, obtain an inventory of their own creative ability, examine blocks to creativity and ways to overcome them, plan tactics for selling ideas, discuss methods for leading creative problem-solving meetings, and analyze strategies for producing organizational change.

H ADM 502 Management and Leadership in the 90s
Fall, second 7 weeks only. 2 credits. Limited to 40 students. Prerequisite for Hotel students: H Adm 212. Elective.
M 1:25–4:25; W 1:25–4:25. R. Perry.
This survey course, including practical exercises and psychometric instruments, examines the trends and movements most likely to influence human resources management as we approach the 21st century. Traditional models of managing and influencing workers will be related to a rapidly changing world situation. Such global conditions as workforces in flux, rising expectations of workers, and the evolving nature of work itself, will be investigated from an international viewpoint.

H ADM 503 International Management
Spring. 3 credits. Limited to seniors and graduate students. Prerequisites: H Adm 303, 165, 225, 325, or M.P.S., M.S., or Ph.D. status. Elective.
M W 2:30–3:45. T. Cullen.
A survey of comparative and cross-cultural management, focusing on similarities and differences among business and management systems from different contexts. Students will examine how different management practices and philosophies develop from cultural variables such as attitudes, beliefs, value systems, and behavioral patterns. The course will emphasize Japanese managment systems.

H ADM 601 Management Intern Program I—Operations
Fall or spring. 6 credits. Open to hotel school juniors and seniors with approval of the MIP faculty committee. Prerequisite: Students are expected to have completed H Adm 103, 136, 165, 174, 211, 212, 225, 226, 236, 243, and 255. In addition, completion of the following courses is strongly recommended: H Adm 303, 325, 335, 355, and 365. Additional course work might be required for applicants considering specialized internships. A detailed plan for the completion of all remaining academic requirements must be approved prior to acceptance into the course. Must be taken in conjunction with H Adm 602. Independent study. S-U grades only, based on four performance evaluations. Elective.

H ADM 602 Management Intern Program II—Academic
Fall or spring. 6 credits. Must be taken in conjunction with H Adm 601. Independent study. Letter grades only, based on reports, journal, debriefing, and oral presentation. Elective.

H ADM 603 Hotel Ezra Cornell
Fall or spring. Variable credit (maximum, 3). Prerequisite: written permission. Elective. Elected board members of Hotel Ezra Cornell may receive credit for developing, organizing, and managing the April "hotel-for-a-weekend" event.

H ADM 701 Seminar in Hospitality and Service Inquiry
Fall. 3 credits. Elective.
W 2:30–5:30. C. Lundberg.
Introduces academic graduate students to the major alternative ways of conceptualizing and designing research and acquiring, interpreting, and disseminating data. Emphasis on implications and consequences of one's choices among alternative perspectives and approaches.

H ADM 705 Management Strategy for the Hospitality Industry
Spring. 3 credits. Prerequisites: all required hotel school M.P.S. first-year core courses, or permission of instructor. M.P.S. requirement.
M W 8:40–9:55. T. Cullen.
Focuses on strategic planning implementation. Consideration is given to decision making relative to the organization's philosophy, mission, and objectives; to the development of an appropriate organizational structure and activities to achieve objectives; and to methods for monitoring the effectiveness of selected strategies. Attendance requirements include five evening sessions during the last three weeks of classes.

H ADM 805 Monograph I
Spring. 3 credits. Limited to first-year M.P.S. students. M.P.S. requirement.
M W 11:15. J. Clark.
Covers procedures for developing and writing the M.P.S. monograph. See the M.P.S. Student Handbook for a full description of the monograph requirement.

H ADM 806 Monograph II
Fall. 3 credits. Prerequisite: H Adm 805. M.P.S. requirement.
See the M.P.S. Student Handbook for a full description of the monograph.

HUMAN RESOURCES MANAGEMENT COURSES

H ADM 210 The Management of Human Resources
Fall or spring. 3 credits. Limited to 100 non-hotel school students, no freshmen. Elective.
T R 1:25. Faculty.
Examines the role of human resources management, starting with an introduction to the personnel function and an analysis of the social, legal, international, and competitive factors. Examines recruitment, selection, training, motivation, development, compensation, performance appraisal, and labor relations. Class discussion and case analysis are emphasized.

H ADM 211 Human Resources Management
Fall and spring. 3 credits. Limited to 100 hotel school students, no freshmen or graduate students. Prerequisite: H Adm 103, H Adm 191 preferred. Required.
M W 12:20. M. Fulford.
An introductory study of the human resource management function, with an emphasis on issues and applications within the hospitality industry. How organizations plan, staff, train, develop, and motivate employees to enhance productivity, advance the quality of work life, and ensure legal compliance.

H ADM 212 Human-Relations Skills
Fall or spring. 3 credits. Limited to 60 students per section, no freshmen. Prerequisite: H Adm 100 or 103 (hotel transfer students may take
H Adm 211 concurrently with H Adm 100). Lab fee, $15. Attendance at first class is mandatory. Required.
M W 8:40–9:55; T R 8:40–9:55. F. Berger, faculty.
Discussion and practice of human-relations skills necessary for managing people. Topics include supervising, motivating, and counseling employees; leading effective meetings; conducting creative problem-solving sessions; and time and stress management. Analysis of individual leadership skills and interpersonal and intergroup process skills will be emphasized.

H ADM 313 Training in the Hospitality Industry
Fall. 3 credits. Limited to 24 students. Prerequisite: H Adm 211. Elective.
T R 2:30–3:45. Faculty.
The training function within the hospitality industry will be analyzed, and a training and employee development model will be presented. Related subjects such as learning theories, task analysis, the writing of objectives, training methods, and program evaluation will be covered at both the conceptual and experiential levels. Students will gain experience designing and implementing a training program for a hospitality organization.

H ADM 414 Organizational Behavior and Small Group Processes
Fall. 3 credits. Limited to 30 hotel school juniors, seniors, and graduate students with written permission of instructor. Elective.
M 7:30– 10 p.m. C. Enz.
Applications of organizational behavior will be explored through lectures, case studies, and management games and exercises. Students will participate in experiential labs aimed at enhancing their effectiveness as members or leaders of groups. Topics include leadership, decision making, motivation, power, and organizational change.

H ADM 416 Special Studies in the Management of Human Resources: Organization and Human Resource Management in Customer Service
Spring. 3 credits. Limited to seniors and graduate students. Prerequisite: H Adm 211 or equivalent. Elective.
T R 10:10–11:25. C. Enz.
Emphasis on diagnosis and design of human resource initiatives to achieve strong service cultures and improve organizational performance. Topics include management of emotions, monitoring and measuring corporate culture, and linkage of human resource practices to service vision, organizational design, and strategic objectives.

H ADM 512 Managing Organizational Change and Productivity
Spring. 3 credits. Prerequisite: H Adm 211 or equivalent. Elective.
T R 8:40–9:55. C. Lundberg.
Emphasizes managerial and consulting techniques to identify and bring about changes in organizations and provides hands-on practice in the design of an improvement program as a mechanism for organizational development.

H ADM 515 Managerial Leadership in the 1990s
Spring. 1 credit. Elective.
Hours to be announced. K. Blanchard.
Focuses on the knowledge and skills that leaders will need to be effective in the 1990s. Emphasis will be placed on recent theories of motivation, behavior, and leadership. Students will learn the basics of situational leadership, applying this knowledge to future managerial positions.

H ADM 711 Negotiations in the Service Industry
Fall or spring. 3 credits. Limited to 40 juniors, seniors, and graduate students. Elective.
T R 8:40–9:55. E. Brooks.
Examines the roles of managers as negotiators, both within the organization and for the organization. Discussion of planning and preparations, tactics, strategies, trends, power, timing, persuasion, the win-win concept, and developing alternatives. Cases and participation in both individual and team negotiations.

H ADM 718 Advanced Human Resources Management
Fall. 3 credits. Limited to hotel school graduate students, and non-hotel school graduate students as space permits or by permission of instructor. M.P.S. requirement.
M W 10:10–11:25. M. Fulford.
Focuses on development of human resources management skills and exploration of the dilemmas and responsibilities of leadership. Emphasis on effects managerial activities have on employee recruitment, selection, and retention systems. Case studies, exercises, and simulations.

FINANCIAL MANAGEMENT COURSES

H ADM 120 Survey of Financial Management
Fall or spring. 2 credits. Limited to non-hotel school students. Elective.
W 2:30–4:25. D. Dunn.
A survey of accounting principles, financial statements, and an introduction to financial analysis. The course is designed for the student who desires a basic general knowledge of the language of business and finance. May be taken with H Adm 322 to include the investment aspects of financial management.

H ADM 123 Financial Accounting Principles
Fall or spring. 3 credits. Limited to non-hotel school students. Elective.
T R 2:30–4:25. D. Dunn.
An in-depth introduction to the principles of financial accounting, involving transaction analysis, flow of accounting data to the financial statements, and careful consideration of accounting for revenues, expenses, assets, liabilities, and owner's equity.

H ADM 125 Finance
Fall or spring. 3 credits. Limited to non-hotel school students. Elective.
M W 11:15–12:30. (For spring 1993, nine weeks only, January 25–March 31, M W 11:15–1:10.) A. Arbel, J. Marler.
Corporation finance topics include time value of money, financial markets, interest rates, financial statement analysis and planning, working capital policy and management, risk and return, risk management, security valuation models, cost of capital, capital budgeting, capital structure, dividend policy, and creative finance.

H ADM 225 Financial Accounting
Fall. 3 credits. Limited to hotel school students. Required.
T R 2:30–4:25. D. Ferguson.
The basic principles of accounting, involving transaction analysis, flow of accounting data to the financial statements, and careful consideration of accounting for revenues, expenses, assets, liabilities, and owner's equity.

H ADM 226 Financial Management
Spring. 4 credits. Prerequisite: H Adm 225 or equivalent. Required.
T R 2:30–4:25. S. Carvell, J. Marler.
Provides a broad understanding of both managerial accounting and finance. The overall objective is to develop skill in using accounting information for managerial planning, control, and evaluation. Topics include financial statement analysis and interpretation, cost behavior, and budgeting. Framework for short-term and long-term financial decision making.

H ADM 322 Investment Management
Fall or spring. 3 credits. Limited to juniors, seniors, and graduate students. Elective.
W 2:30–3:45. (For spring 1993, nine weeks only, January 25–March 31, M W 2:30–4:45.) A. Arbel.
Covers institutional and analytical aspects of security analysis and investment management: securities markets, sources of investment information, risk-return analysis, bonds and stocks valuation, behavior of security prices, portfolio analysis, asset allocation, and portfolio management. The course also covers the capital asset pricing theory, generic stock investment strategy, and the screen-to-profile approach and their practical implications for security analysis and investment management. Computer-assisted analysis in which students participate in an investment game. No previous knowledge of computers is required.

H ADM 323 Hospitality Real-Estate Finance
Spring. 3 credits. Prerequisite: H Adm 325, or equivalent. Elective.
M W 12:20–1:45. J. Eyster.
Focuses on real estate financing for hospitality-oriented projects. Topics include methods of measuring rates of return; feasibility and appraisal processes; equity and debt financing vehicles to include joint ventures, limited partnerships, construction mortgages, participating, convertible, and seller-financed mortgages; forms of operating agreements to include management contracts, leases, and franchises; workout strategies for distressed properties; trends in international hotel franchising; and ethical issues of real estate development. Presentations of hospitality industry real estate practitioners.

H ADM 325 Hospitality Financial Management
Fall. 3 credits. Prerequisite: H Adm 226. Required.
T R 8:40–9:55. J. Eyster.
Integrates the areas of financial accounting, managerial accounting, and finance and applies the interpretive and analytical skills of each to hospitality-industry situations. Topics include uniform system of accounts, revenue and expense tracking and internal control, accounting systems, ratio and comparative analysis, cost-volume-profit analysis, pricing, operational budgeting, project capital budgeting, decision-making, equity and debt financing structures, and operating agreement forms. Students analyze hospitality operations and projects and present their findings in management report form.

H ADM 326 Corporate Finance
Fall. 3 credits. Limited to juniors and seniors. Prerequisite: H Adm 325. Elective.
M W 11:15–1:10. S. Carvell.
In-depth analysis of corporate financial management, including financing alternatives and capital structure decisions, cash management, capital budgeting decisions, risk analysis, and working capital management. Although applicable to all businesses, special attention is placed on issues important to the hospitality industry. Emphasizes analytical methods through case studies and an in-depth semester project.

H ADM 328 Advanced Hospitality Managerial Accounting
Spring. 3 credits. Prerequisite: H Adm 226, 325, or equivalent. Elective.
T R 10:10–11:25. D. Ferguson.
Emphasis is on the use of accounting information for managerial planning, control, analysis, and evaluation. Included are the principles of managerial accounting, cost allocation, management control, models for decision making, and the special topics of joint products, transfer pricing, responsibility accounting, and performance measurement. Explores the application of managerial accounting concepts to the hospitality industry. Case studies.

H ADM 421 Internal Control in Hotels
Spring. 2 credits. Limited to 30 seniors and second-year graduate students. Prerequisite: H Adm 325, 725, or equivalent. Elective.
T R 9:05. N. Geller.
Discussion of problems encountered in distributing the accounting and clerical work in hotels and restaurants so as to provide an effective system of internal control. Study of cases of the failure of internal control and the analysis of the causes of the failure. Practical problems, the impact of technology, and actual techniques of functioning systems of internal control are examined.

H ADM 422 Taxation and Management Decisions
Fall. 3 credits. Limited to 50 upperclass and graduate students. Elective.
W 2:30–4:25. A. Sciarabba.
An introduction to tax advantages and disadvantages of various organizational structures, including corporations, partnerships, and subchapter "S" corporations; financial information reporting to tax authorities and shareholders and how they differ; use of depreciation methods to achieve tax reductions; syndication techniques; and the role tax laws play in promoting private investment and development.

H ADM 522 Hospitality Revenue Management
Fall. 3 credits. Limited to graduate students, and seniors by permission of professor. Prerequisite: background in economics, marketing, and finance. Elective.
M 9:05–11; W 9:05. A. Arbel.
The course covers new techniques in hotel and restaurant pricing and yield management policies, including pricing theory as applied to the service industry, the ideal pricing system, the concept of revenue management, implementing revenue management, the diagnostic system, cost and demand sides, simultaneous solution, multipricing systems, market segmentation, product differentiation, price discrimination, feedback mechanisms, and update and control. New computer programs for revenue and yield management will be evaluated.

[H ADM 523 Financial Management Policy
Spring. 3 credits. Limited to 30 students; non-hotel students must receive permission of instructor. Prerequisites: H Adm 326 or 726. Elective. Not offered 1992–93.
T R 11:55–1:10. S. Carvell.
The course will cover numerous policy issues in financial management. Each of these issues will affect the potential profitability and survivability of the firm under conditions of uncertainty. The course will concentrate on nine major policy issues including capital structure, dividend policy, lease vs. buy analysis, and working capital financing.]

H ADM 524 Short-Term Asset Management
Fall. 3 credits. Prerequisite: H Adm 326, 726, or equivalent. Elective.
M W 2:30–3:45. S. Carvell.
Examines why a significant number of hospitality firms either fail or experience suboptimal performance as a direct consequence of their inability to efficiently manage working capital accounts. Topics include collection and disbursement systems, short-term investments, accounts receivable and inventory management, liquidity, cash management, and hedging interest rate and currency exchange risk. Various quantitative techniques are applied to these topics.

H ADM 721 Hospitality Real Estate Finance
Spring. 3 credits. Elective.
M W 12:20–1:45. J. Eyster.
Focuses on real estate financing for hospitality-oriented projects. Topics include methods of measuring rates of return, feasibility and appraisal processes, equity and debt financing vehicles, and forms of operating agreements. Presentations of hospitality industry real estate practitioners will tie course material to current industry practices.

H ADM 724 Analysis and Interpretation of Financial Statements
Fall. 3 credits. Limited to seniors and M.P.S. students. Elective.
T R 10:10–11:25. J. Marler.
The course covers the financial accounting issues that are encountered in reporting the results of operations for corporate enterprises. Accounting principles and future extensions are discussed. Emphasis is on the components of financial statements, how and why they are reported, and their impact on the overall financial position of the firm and its acceptance in capital markets. Emphasis is on both outsiders' views of the company and decision making through interpretation of financial statements.

H ADM 725 Graduate Managerial Accounting in the Hospitality Industry
Fall. 3 credits. M.P.S. requirement.
M W 12:20–2:15. N. Geller.
Hotel and restaurant accounting systems that provide decision-making information to management are reviewed. Methods of operational analysis for hospitality properties are evaluated and utilized to include ratio, comparative, and cost-volume-profit analyses.

Other topics include internal control, operational budgeting, and the use of feasibility studies.

H ADM 726 Graduate Corporate Finance
Spring. 3 credits. Limited to graduate students. Non-hotel school students must receive permission of instructor. Prerequisite: H Adm 725. M.P.S. requirement.
T R 8:40–9:55. S. Carvell.
An introduction to the principles and practices of corporate finance, including the development of theory and its practical application. Topics include valuation concepts, risk analysis, capital budgeting, cost of capital, capital structure, dividend policy, long-term financing, working capital, management and financing, and mergers and consolidations. Emphasis on analysis of project debt capacity, bankruptcy, financial restructuring, and recapitalization.

FOOD AND BEVERAGE MANAGEMENT COURSES

H ADM 136 Food and Beverage Management
Fall or spring. 4 credits. Limited to hotel school students. Required.
M W 1:25–3:20. G. Norkus, C. Muller.
An introduction to the principles of food and beverage management, beginning with an overview of the food service industry at large. Attention is focused on major industry segments, business practices, and trends. Detailed consideration is given to the components of the food service system: marketing, menu planning, logistical support, production, service, controls, and quality assurance. Product and systems differentiation in various industry segments are emphasized.

H ADM 230 Introduction to Culinary Arts
Fall or spring. 2 credits. Limited to non-hotel school students only. S–U grades only. Attendance at first class is mandatory. Elective.
M 10:10–2:10; T 1:25–5:25; T 6:30–10:30 p.m.; W 6:30–10:30 p.m.; F 9:05–1:05; F 2–6. Faculty.
Studies of food groups, their respective methods of preparation, cooking, presentation, and holding. Designed for non-hotel students who are interested in learning the professional approach to food preparation and service with hands-on practice. Food product identification, preparation and service methods, and professional language of food and cooking.

H ADM 234 Food and Beverage Control
Fall. 2 credits. Limited to 24 students. Prerequisite: H Adm 136. Elective.
R 12:20–2:20. T. O'Connor.
Studies the food and beverage operation from the position of both the food and beverage controller and the food and beverage analyst. Control systems and analytical techniques are studied and applied to operational situations.

H ADM 236 Culinary Theory and Practice
Fall or spring. 4 credits. Prerequisite: H Adm 136. Required.
M F 8:40–9:55. T. Neuhaus, B. Richmond, and S. Gould.
Designed to introduce the student to food and beverage operations through three major components: fundamental food composition and properties, food products and preparation, and food safety and sanitation. Students will prepare recipes, menus, and production schedules and will develop the ability to recognize properly prepared foods through preparing, tasting, and evaluating foods. They also will develop an awareness of potential production problems and how to troubleshoot them.

H ADM 331 Food Service Distribution Management
Fall. 3 credits. Elective.
F 1:25–4:20. G. Norkus.
Designed to acquaint the student with the food service distribution industry. Analyzes the history and origins of food service distribution, the distributor's role in supporting the operations of the restaurant industry, and the specific disciplines of food service distribution.

H ADM 335 Restaurant Management
Fall or spring. 4 credits. Limited to hotel school students and others with permission of the instructor. Prerequisites: H Adm 136 and 236. Approximate cost of utensils and manual, $60. Once enrolled, students may not drop the course without permission of instructor. Required.
F 11:15–1:10. D. D'Aprix, G. Pezzotti, B. Halloran, J. Ridley, and R. White.
A restaurant-management course in which each student participates as a manager of an upscale, full-service restaurant operation. Topics related to the general management of restaurants, including issues in defining a service philosophy, improving profit margins, securing adequate labor supplies, identifying target markets, and planning for organization growth. The laboratory is based on a hands-on managerial component, from which students become familiar with the various requirements for success of each of the line positions in a restaurant.

[H ADM 336 Principles of Nutrition
Fall. 3 credits. Prerequisites: H Adm 136 and 236 and corequisite, H Adm 337, or permission of instructor. Field trip, $40. Elective. Not offered 1992–93.
T R 9:05. M. Tabacchi.
Designed especially for students interested in planning menus to meet the nutritional needs of the dining public. Students learn how to market healthful foods and study computer nutrient data bases, nutrition labeling, truth in menus, special diets, fad diets, and the current and future nutritional needs of the population. Discussions include how to counteract the public's misconceptions and myths. Laboratory sessions emphasize creative production of high-quality, nutritious, safe food.]

H ADM 337 Specialty Foods
Fall. 4 credits. Limited to juniors, seniors, and graduate students. Prerequisites for hotel students: H Adm 136 and 236. Elective.
T R 10:10–12:05. T. Neuhaus.
An advanced course covering finer points of cooking and baking. A culinary, chemical, and marketing perspective will be taken using principles of organoleptical food evaluation. Topics include flavor marriages, garnishes, unusual vegetables and fruits, marinades, charcuterie, wild game, fermentations, and chocolates.

H ADM 338 Health and Fitness in the Resort Hotel and Spa Industry
Fall. 3 credits. Field trip, $40. A previous course in nutrition or food science is helpful but not required. Elective.
M W 11:15. B. Richmond.
Especially for students who are interested in the fitness and nutrition trend in restaurants, resorts, and hotels. Nutritious menu design and the design of fitness programs, equipment, and facilities will be emphasized. Topics include personnel required, assessing personal fitness levels, and legal, medical, and managerial implications. Guest speakers from various spas, wellness centers, and fitness centers.

[H ADM 339 Airline Food Service Management
Fall. 3 credits. Field trip, $50. Prerequisites/Corequisites: H Adm 136, 236, or permission of the instructor. Elective. Not offered 1992–93.
M W 2:30–3:45. M. Tabacchi.
Airline food service, unique in the food and beverage industry, involves a thorough knowledge of the airline industry and depends on the state of the economy, the financial success of the airline industry, and economies of scale. Students study the planning of airline meals, their production by vendors, their distribution by specialized companies, and their assembly and delivery by caterers. A field trip to an airline's hub city enables students to visit flight kitchens, vendors, airline representatives and distributors. Guest speakers representing various sectors of the industry (airline food and beverage managers, airline marketing personnel, entrepreneurs who provide goods and services, and in-flight catering executives) are included.]

H ADM 430 Introduction to Wine and Spirits
Fall or spring. 2 credits. Wine glass kit, $15.00. Limited to hotel school juniors, seniors, and graduate students, and seniors and graduate students in all other colleges. Hotel students encouraged to enroll in the fall. All students, except those in the hotel school, must be 21 years old by the first day of university classes (August 27, 1992). S-U grades only. Elective.
W 2:30–4:25. S. Mutkoski.
An introduction to the major wine-producing regions of the world and what the consumer needs to know to purchase wines, spirits, and beers at retail outlets and in a restaurant setting. Topics include flavor components in wine, pairing wine and food, responsible drinking, selecting quality and value wines, and wine etiquette. Samples from a variety of countries, regions, and vineyards are evaluated.

(Preregistered students who do not attend the first class and fail to notify the course secretary in 274 Statler of their absence are automatically dropped from the instructor's records. The student must then follow the normal drop procedure in his or her school.)

H ADM 431 Seminar in Independent Restaurant Operations Management
Fall or spring. 3 credits. Five field trips, $250. Limited to 20 students. Prerequisite: written permission of instructor. Elective.
T 2:30–4:25. T. Kelley, G. Norkus.
Designed for students who have a strong interest in food and beverage operations and who may be considering a career as an entrepreneur. Students visit and analyze various independently owned restaurant operations. Analysis covers the restaurant's concept (market), organization, ownership, management, physical structure, staff, front- and back-of-the-house operations, and fiscal

integrity. Readings relevant to current topics in the restaurant industry are required. Classes alternate weekly between field trips and seminar/case presentations.

H ADM 432 Seminar on Specialty Beers
Fall, first 7 weeks only. 2 credits. Field trips, $50. Limited to 20 hotel school seniors and graduate students, and others with permission of the instructor. Elective.
M 1:25–3:20. J. Crouch.
Designed for upper-level students who intend to pursue food and beverage careers. Advances one's knowledge about beers and other malt beverages in terms of managing such products in a restaurant setting or other food service outlet. Topics include the brewing process, sensory aspects of beer and other malt beverages, international beer types and styles, marketing malt products, purchasing and distribution, storage and service, beer and food pairings, staff training and education, cost controls, and third-party liability issues.

H ADM 433 Food-Service Management in Business, Industry, and Health Care Facilities
Spring. 3 credits. Field trips, $100. Limited to 25 students. Prerequisites: H Adm 136 and 236. Elective.
W 10:10; F 10:10–12:05. T. O'Connor.
Designed to explore and analyze the food service management in business, industry, and health-care facilities, e.g., office/industrial complexes, educational institutions, contract companies, and hospital and extended-care facilities. Characteristics of food service organization structures, job descriptions, controls, systems design, equipment, and government/legal regulations. Readings, small investigative projects, discussions, and local site visits.

H ADM 434 Desserts Merchandising
Spring. 3 credits. Prerequisite: H Adm 236, or permission of the instructor. Elective.
R 9:05. T. Neuhaus.
A hands-on course providing exposure to a variety of breads, pastries, cakes, and other desserts. Students develop large-scale production skills, become familiar with bakeshop utensils, and sell their products.

H ADM 435 Selection, Procurement, and Supply Management
Spring. 3 credits. Limited to 24 students. Prerequisite: H Adm 136 or 731. Elective.
T 10:10–12:05. G. Norkus, R. Spies.
Expands upon the concepts of purchasing and supply management that were developed in H ADM 136 and 731. Designed to expose the student to two specific areas: the management of the procurement system and the major commodity groups that are germane to the operation of a hotel or foodservice operation. Lectures include discussions on the comparison of the purchasing function in the hospitality industry to other industries, distribution systems, legal and ethical implications in buyer-seller relationships, procurement options, buying strategy development, price protection programs, and other contemporary issues. Students work with the major entree food groups: meats, seafood, and poultry, with emphasis placed on identification, quality and condition, market form, yield tests, and cost analyses.

H ADM 436 Beverage Management
Fall or spring. 2 credits. Limited to 30 hotel school students. Prerequisite: H Adm 430. Elective.
W 10:10–12:05. S. Mutkoski.
Designed for upperclass students who intend to pursue food and beverage as a career. Deals specifically with the management of beverage operations. Lectures develop skills in and awareness of dram shop liability; staff training and responsible customer service; beverage pricing; food and wine pairings; wine list development; purchasing, storage, and service; wine regions; cost controls and loss prevention; and creative beverage merchandising. Guest lecturers.

H ADM 437 Seminar in Cultural Cuisines
Fall. 3 credits. Limited to 20 students. Prerequisite: H Adm 165 and 236 and/or permission of the instructor. Elective.
T 2:30–4:25. T. O'Connor.
This seminar explores various cuisines in terms of history, lifestyle, and foods peculiar to a culture. Through readings, research, and meal preparation, students explore various cuisines in depth. The goal of the course is to develop an awareness of several international cuisines, enabling students to make comparisons and draw relationships among the foodways of different cultures. Students prepare research reports and oral presentations, and design menus and orchestrate their preparation.

H ADM 438 Catering Management
Fall. 2 credits. Limited to 20 students. Prerequisite: H Adm 335, 732, or permission of instructor. Elective.
T 12:20–2:15. R. Spies.
Examines on- and off-premise catering for business and social functions, as well as sports events and office catering. Topics include the organizational structure of catering operations; legal aspects of catering businesses; menu design for special functions and its operational implications; marketing from a caterer's perspective; function planning and management; staff recruitment, training, and supervision; and post-event analysis.

H ADM 439 Wine in Culture and History
Fall or spring. 2 credits. Limited to 200 students.
M 2:30–4:25. Faculty.
Designed to provide students with a cultural and historical perspective on wine and its place in society. Topics include history, people, culture, production of wine in specific wine-producing regions of the world, current wine and health issues, wine and food pairing, cooking with wine, and retail wine buying strategies.

H ADM 531 Reviewing the Restaurant: The Consumer's View of the Dining Experience
Fall. 3 credits. Field trip $200. Limited to 20 students. Prerequisites: H Adm 165 and 335, or permission of the instructors. Elective.
Lec, M 12:20–2:15; lab, W 1:25–2:15.
T. Kelly, J. Lumley.
Trains the student to perform a comprehensive analysis of the restaurant dining experience. The role of the restaurant critic/reviewer will be discussed in depth. The student will examine and enhance his or her critical writing skills, as the course will require each student to complete approximately ten restaurant reviews.

H ADM 532 Seminar in Chain-Restaurant Operations Management
Fall. 3 credits. Prerequisite: H Adm 136 or permission of instructor. Elective.
T R 10:10–11:40. C. Muller.
Chain-affiliated restaurants account for an ever-increasing market share of all food service dollars. The growth of multi-unit chain operations brings out unique challenges, opportunities, and strategic orientations for restaurant management. This course will identify these present issues, the historical factors that have led to them, and the pending economic and organizational questions facing the chain restaurant segment. Case study analyses, company research, and a term project.

H ADM 533 Current Issues in Food Safety and Sanitation
Spring. 2 credits. Elective.
R 1:25–3:20. B. Richmond.
A study of current issues in food safety and sanitation procedures and regulations that affect managerial decisions in food service and hospitality operations. Topics include risk assessment and hazard analysis; legal responsibilities related to food, food handlers, and equipment and facilities; food-borne illness and other public-health concerns; and certification and training. Preparation for NIFI/NRA certification and the Food Protection (ETS) certification exam (optional) is offered.

H ADM 534 Specialty Food and Beverage Operations: Guest Chefs
Spring. 3 credits. Limited to 20 students. Prerequisite: H Adm 335 or 732. Elective.
W 2:30–5:30. R. Spies, G. Pezzotti, B. Halloran.
Designed for students with a strong food and beverage orientation, especially students considering careers in the hotel food and beverage environment, or those who anticipate interacting with current culinary trends. Working in groups, students market, organize, plan, produce, serve, and prepare the financial analysis and accounting relative to four guest chef specialty production nights for the Cornell community, utilizing the Statler Hotel facility.

H ADM 536 Contemporary Health Foods: A Foodservice Practicum in Spa-Style Cuisine
Fall. 3 credits. Limited to 20 seniors and graduate students, or by permission of instructor. Elective.
W 12:20. B. Richmond.
Builds an awareness and understanding of today's health-conscious food service consumer. Topics include marketing, menu design and implementation, and hands-on experience in carrying out a nutritionally aware or "spa-designed" food concept.

H ADM 538 Gastronomy: Wine and Food Pairing Principles and Promotion
Spring. 2 credits. Limited to 20 seniors and graduate students. Prerequisite: H Adm 436. Elective.
M 1:25–3:20. Faculty.
Focuses on the pairing and creative marketing of wine and food. Students study and taste regional, varietal wines with various foods to understand wine and food pairing. Topics include wine and social issues, wine list development, special event promotion, on-premise merchandising, and training of staff. Wine and food tastings presented to industry guests.

H ADM 731 Food and Beverage Management
Fall. 3 credits. Limited to hotel school graduate students. M.P.S. requirement.
T R 10:10–11:25. T. Kelly.
Focuses on the technical, managerial, and human-resources skills needed to be successful in food service management. Topics include market analysis, concept development, menu planning, operations management, and marketing.

H ADM 732 Graduate Restaurant Management
Spring. 3 credits. Limited to 30 students. Prerequisite: H Adm 731. M.P.S. requirement.
F 11:15–1:10. R. Spies.
A food and beverage management course in which the class operates the Terrace Restaurant. The production lab allows students to rotate through the various line positions of a restaurant operation. In turn, each student serves as the manager with responsibilities for menu planning, marketing, pricing, scheduling, guest relations, and profitability. In-depth discussions of management issues related to restaurant operation occur during the lectures/seminars.

MARKETING AND TOURISM

H ADM 242 Marketing Principles
Fall or spring. 3 credits. Limited to non-hotel school students only.
T R 2:30–3:45. R. Bell.
An introductory course providing a basic understanding of consumer purchase decision making, product planning, distribution, promotion, and pricing. Companies and their current marketing strategies will be examined to better understand these fundamental tenets of marketing and how they contribute to the crucial process of strategic planning. Students taking the course for four credits will participate in the lecture and separate laboratory.

H ADM 243 Principles of Marketing
Fall or spring. 3 credits. Not open to freshmen. Required.
T R 10:10–11:25. W. Kaven.
Provides an overview of the discipline of marketing as it applies to the hospitality industry. Topics include understanding how a marketing strategy is devised, especially the interrelationship of company objectives, internal resources, and the external operating environment, and how the special nature of services affects the development of marketing strategies in the hospitality industry.

H ADM 244 Tourism I
Fall. 3 credits. Not open to freshmen. Elective.
T R 10:10–11:25. M. Noden.
An introductory course in the study of tourism. The origins and evolution of contemporary tourism are examined. Students are familiarized with the various supply components of the tourism industrial base and their integration on an international scale. The effects of mass-volume tourist demand on destination development are explored through the use of selected limited case studies. Guest lectures highlight the economic operations and effects of tourism in both the public and private sectors.

H ADM 245 The Basics of Hotel Sales
Spring. 3 credits. Field trip, $50. Limited to 30 students. Prerequisite: H Adm 243, 741, or equivalent. Elective.
F 1:25–5. R. Bell.
Emphasis on skills and knowledge leading to an understanding of the role of successful property level sales person. Roles of types of sales positions at the hotel level, tools necessary to make it up the ladder, operation of a hotel sales function, and differing buying strategies of market segments.

H ADM 349 Seminar in Selected Cases in Hospitality Marketing
Spring. 3 credits. Prerequisite: A principles of marketing course. Elective.
T R 11:55–1:10. L. Renaghan.
An integrative course that provides senior marketing students and others an opportunity to relate concepts from a variety of marketing courses to the application of sound management decisions.

H ADM 444 Tourism II
Spring. 3 credits. Limited to 20 juniors, seniors, and graduate students. Prerequisites: H Adm 243 and 244, or equivalents, or written permission of instructor. Elective.
T R 11:55–1:10. M. Noden.
An advanced course in the study of tourism. Emphasis is placed on the development of the tourism industrial base and development and financing of superstructure and infrastructure. Econometric model development for demand predictions are examined and analyzed. Students are expected to engage in a wide range of discussion and analysis of the effects of tourism on various environments in social and economic terms. Case studies, occasional guest lectures.

H ADM 449 International Marketing
Fall or spring. 3 credits. Limited to 25 students. Prerequisites: Micro and macroeconomics. Elective.
T R 2:30–3:45. W. Kaven.
Develops students' understanding of international marketing with emphasis on hospitality-industry applications. Focuses on the similarities and differences that exist between domestic and international marketing and the conduct of international marketing in various segments of the world.

H ADM 542 Marketing Communication Media
Spring. 3 credits. Limited to seniors and graduate students. Prerequisite: a previous marketing course. Elective.
M 1:25–4; W 1:25. C. Dev, P. Yesawich.
Develops understanding of international marketing with emphasis on hospitality industry applications. Focuses on similarities and differences between domestic and international marketing and the conduct of international marketing in various segments of the world.

H ADM 543 Marketing Research
Fall or spring. (In 1992–93, spring only). 3 credits. Limited to hotel school seniors and graduate students. Prerequisites: a previous marketing course and 3 credits of statistics or H Adm 191 or H Adm 791. Elective.
M W 10:10–11:25. M. Morgan.
The purpose of this course is to introduce students to the use of marketing research methods in gathering and analyzing the information needed to make marketing management decisions. Examples and exercises will focus primarily on service industries.

H ADM 544 Services Marketing
Fall or spring. 3 credits. Limited to seniors and second-year graduate students. Prerequisite: a previous marketing course or permission of the instructor. Elective.
M W 8:40–9:55. L. Renaghan.
Students preparing for ownership or management positions will develop an understanding of services marketing principles applicable across entire service sector. Topics include marketing strategies of service firms, new marketing approaches, and the reformulation of traditional marketing principles from consumers and industrial goods marketing.

H ADM 546 Marketing Planning for Hotels
Fall. 3 credits. Prerequisite: A principles of marketing course. Elective.
T R 11:55–1:10. R. Bell.
Key variables in property level management and their proper application in developing a marketing plan, e.g., marketing intelligence, demand analysis, supply and competitor analysis, segment analysis, resource allocation, sales strategies and measurement of results. Upon completion of the course, the student should be able to design, develop, and implement a comprehensive, targeted, and action-oriented marketing plan for a lodging property.

H ADM 547 Consumer Behavior
Fall. 3 credits. Limited to seniors and graduate students. Prerequisite: a principles of marketing or marketing management course. Elective.
T R 8:40–9:55. M. Morgan.
The purpose of this course is to introduce students to ways in which concepts from cognitive and behavioral psychology and sociology are used in developing marketing strategy. Examples and exercises will focus primarily on service industries.

H ADM 641 Marketing Decision Models
Spring. 3 credits. Limited to seniors and graduate students. Prerequisite: a principles of marketing course and either a 3-hour statistics course or H Adm 191 or 791.
M W F 10:10. M. Morgan.
Introduces students to the use of computer-based models and statistical data analysis in making hospitality marketing management decisions. Computerized exercises in lodging product design, site selection, market segmentation, restaurant sales forecasting, and predicting vacation travel destination choice.

H ADM 741 Graduate Marketing Management
Fall. 3 credits. M.P.S. requirement.
T R 2:30–3:45. C. Dev.
The management of the marketing function in firms operating in the hospitality industry. The emphasis is on developing students' organizational, analytical, and decision-making capabilities through involvement in case experiences. No prior marketing knowledge is assumed.

H ADM 742 Strategic Marketing in the Hospitality Industry
Spring. 3 credits. Limited to graduate students. Prerequisite: a previous marketing course and permission of instructor. Elective.
W 7:30–10:15 p.m. C. Dev.
Corporate marketing concepts and principles. Topics include evaluating business trends, SWOT analysis, segmentation, positioning, competitive advantage and life cycle, strategic alliances, global marketing strategies, and

marketing strategies related to products and services, pricing, communication, and distribution. The course will emphasize state-of-the-art strategic marketing issues and applications through class discussion and interaction with guest speakers.

PROPERTIES MANAGEMENT COURSES

H ADM 255 Hotel Development and Planning
Spring. 3 credits. Not open to freshmen. Required.
M W F 10:10. J. deRoos, R. Penner.
An introduction and management overview of the problems and opportunities inherent in the development and planning of hospitality facilities. Topics include the project development sequence; conceptual and space planning; architectural design, engineering, and construction criteria; and the interpretation of architectural and consultant drawings. Emphasis is on setting appropriate facilities requirements, understanding industry practice, and implementing properties decisions within a balanced design, operations, and financial framework.

H ADM 350 Real Estate Management
Fall. 3 credits. Elective.
M 1:25–4:30. D. Whitehead.
Designed for students interested in the management of residential and commercial real estate. Overview of real estate economics, the relevant law, and different aspects of property management including leases and management contracts, accounting and finance, staffing, and building operations. Examples from several types of properties.

H ADM 351 Hospitality Facilities Design
Fall. 3 credits. Prerequisite: H Adm 255 or 751 or permission of instructor. Elective.
F 12:20. R. Penner.
A lecture-studio course dealing with property development, planning, and design by focusing on the interpretation and analysis of restaurant and hotel plans. Students learn basic graphic techniques and apply them to planning problems for hospitality facilities.

H ADM 352 Hotel Planning and Interior Design
Spring. 3 credits. Field trip, $200; drawing supplies, $75. Limited to 20 students. Prerequisite: H Adm 351. Elective.
F 1:25. R. Penner.
A project course concerned with hotel planning, interior design, and renovation. Students establish the operator's criteria for the renovation of hotel guestrooms and public areas, prepare budgets, and develop preliminary conceptual designs leading to a substantial graphic presentation. Drawing ability is essential.

H ADM 353 Food Service Facilities Design
Spring. 3 credits. Limited to 12 students. Prerequisites: H Adm 351 and 335 (coregistration is acceptable). Elective.
M W 1:25. Faculty.
An introduction to the basic concepts of food service facilities design and planning. Students will determine space allocations for kitchens and their support areas; develop basic production work flow in the preparation and service areas; and select equipment utilizing standards for production capability, quality of construction, and ease of maintenance. Students will use studio time for planning, designing, and writing specifications for a medium-size restaurant kitchen.

H ADM 354 Computer-Aided Design
Fall and spring. 2 credits. Prerequisite: H Adm 351 or equivalent studio experience. Elective.
T 11:15–1:10; W 11:15–1:10. J. deRoos.
The operation of microcomputer-based computer-aided design (CAD) systems. Using AutoCAD on the IBM PC, the course presents an organized and logical sequence of commands, mode settings, drawing aids, and other characteristics of CAD. Students will learn the program in the school's computer center and will develop a complete graphic presentation.

H ADM 355 Hospitality Facilities Operations
Fall. 3 credits. Prerequisite: H Adm 255. Required.
M W F 10:10. J. deRoos.
An overview of the operation of hospitality facilities, including operating costs for various types of facilities, types and characteristics of major building systems, and the responsibilities of the engineering-maintenance departments. The renovation needs of hospitality facilities are examined and key managerial aspects of renovations considered.

H ADM 356 Hospitality Risk Management
Fall. 3 credits. Limited to 30 hotel school juniors, seniors, and graduate students. Students may not receive credit for both H Adm 356 and 357. Elective.
T R 8:40–9:55. D. Stipanuk.
Risk management within the hospitality environment as applied to issues of control and risk financing. Issues in fire protection, customer and workplace safety, OSHA and Right-to-Know requirements, and customer and corporate security are analyzed. Basic elements of insurance and crisis management are discussed.

H ADM 357 Insurance and Risk Management
Fall and spring. 3 credits. Prerequisite: an introductory accounting or business course. May not be taken for credit in addition to H Adm 356. Elective.
M 7:30–10 p.m. J. Ferris.
A comprehensive look at risk management within a general business or institutional environment. The course reviews insurance and non-insurance solutions to controlling loss, the general legal environment within which risk management processes work, and the integration of crisis management into the overall corporate risk management plan.

H ADM 450 Principles of Real Estate
Fall. Limited to juniors and seniors (graduate students must enroll in H Adm 651). 3 credits. Elective. (Formerly H Adm 350.)
T R 2:30–3:45. J. Corgel.
Approaches real estate from four perspectives: legal, economic, financial, and business. Understanding these perspectives will enable students to make better investment and financing decisions, to use real estate resources wisely, to understand public-policy issues, and to be prepared for additional courses in real estate investment, finance, and development.

H ADM 451 Seminar in Properties Management
Fall. 1 credit. Elective.
F 11:15. J. Clark.
Exposes students to the breadth of disciplines within properties management. Guest speakers from industry, academia, and student ranks will present and discuss issues related to design, development, real estate, construction, facility operations, and risk management.

H ADM 455 Special Topics in Properties Management
Spring. 3 credits. Limited to juniors, seniors, and graduate students. Elective.
Hours to be arranged. Faculty.
The theme and instructor of the "special topics" course will change each year on the basis of current trends, student interest, and faculty expertise. See the school registrar or properties area coordinator for details about the current topic.

H ADM 456 Hospitality Facilities Management
Spring. 3 credits. Prerequisites: H Adm 355, 751, or permission of the instructor. Elective.
T R 11:55–1:10. D. Stipanuk.
Examines building engineering systems and the management of physical facilities in the hospitality industry, including the organization of the maintenance and engineering functions. Includes visits to other campus buildings to survey their engineering systems.

H ADM 457 Advanced Development and Construction
Fall. 3 credits. Limited to 24 seniors and graduate students. Elective.
M W 2:30–3:45. D. Stipanuk.
Focuses on the management structure and systems, laws, regulations, and industry practices that most influence the successful development or renovation of lodging and eating facilities. Topics include scheduling, budgeting, managing other professionals, and analysis of alternative materials and methods. Guest speakers, case studies, and group project.

H ADM 458 Hospitality Real Estate
Spring. 3 credits. Prerequisites: H Adm 323, 450, or permission of the instructor. Elective. (Formerly H Adm 358.)
T R 10:10–11:25. J. Corgel.
Expands the student's understanding of the role of real estate in individual hospitality businesses and corporations. It is designed for those who plan careers in the hospitality industry. Specific objectives are to develop an appreciation of real estate as a factor in the production of income of hospitality businesses; to develop an appreciation of real estate as an asset that can be managed, sold, and otherwise used to increase the wealth of hospitality corporation shareholders; and to understand the importance of valuing real estate, gain working knowledge of valuation approaches, and be aware of contemporary hospitality valuation issues.

H ADM 651 Principles of Real Estate
Fall. 3 credits. Limited to graduate students. Elective.
T R 2:30–3:45. J. Corgel.
This survey course approaches real estate from four perspectives: legal, economic, financial, and business. Understanding these perspectives will enable students to make better investment and financing decisions, use real estate resources wisely, understand public policy issues, and be prepared for additional

courses in real estate investment, finance, and development.

This graduate section includes the H Adm 450 lectures, plus an hour-long recitation each week which features guest speakers from industry, faculty from other colleges, and case studies. Graduate students are required to submit individually a comprehensive term project.

H ADM 658 Advanced Real Estate
Spring. 3 credits. Prerequisites: H Adm 323, 450 or 651. Elective.
T R 2:30–3:45. J. Corgel.
Promotes sound real estate investment and finance decision making through the use of advanced theory and techniques in financial economics. Real estate investment decisions are made through applications of the after-tax discounted cash flow model which incorporates prevailing domestic and international economic conditions in real estate markets, tax rules, and government regulations. Financing decisions are made using the techniques of modern financial analysis. A wide array of financing options is considered including convertible, participating, and accrual mortgages. All types of residential and non-residential real estate are analyzed; however, special emphasis is placed on the analysis of hospitality properties.

H ADM 751 Project Development and Construction
Fall. 3 credits. M.P.S. requirement.
W F 8:40–9:55. R. Penner, J. Clark.
The major elements of the project-development, hotel-planning, and construction process. Topics include the role of the development team, feasibility studies, functional planning and design, architectural and engineering criteria, construction contracts, project scheduling, interpretation of architectural drawings, and building construction management. Student groups will prepare the program documentation for a new hotel in conjunction with other M.P.S. courses.

COMMUNICATION COURSES

H ADM 165 Managerial Communication: Writing Principles and Process
Fall or spring. 3 credits. Each lecture limited to 18 students. (Because of the strict class-size limitation, a student who chooses to drop this course should notify the instructor no later than the end of the first week of class so another student can fill the opening.)
Required.
Lec 1, M W F 10:10; lec 2, M W F 10:10; lec 3, M W F 9:05 (spring lec, M W F 11:15); lec 4, M W F 11:15 (spring lec 4, M W F 1:25); lec 5, T R 8:30–9:45 (spring lec 5, T R 12:20–1:35); lec 6, M W F 1:25 (spring lec 6 M W F 9:05); lec 7 M W F 11:15 (no spring lec 7). D. Jameson, D. Flash, S. Kiner, J. Lumley, E. Huettman, and faculty.
An introduction to written communication within a business context. Students learn how to conceive, plan, and develop those written materials that provide much of the information that people in business need to form judgments and make decisions. Focusing on the specific principles, needs, and responsibilities of business communication, the course introduces students to the writing process: analyzing, organizing, using research sources, developing substance, and writing in a clear, precise style. Students write a variety of reports requiring different analytical approaches.

H ADM 266 Intermediate French: Le Francais de l'Hotellerie et du Tourisme
Spring. 3 credits. Limited to 15 students. Prerequisite: French 123 or equivalent (CPT 560 or above), or permission of instructor. Elective.
M W F 12:20; one hour to be arranged. A. Grandjean-Levy.
Offers continuing study of the French language with specific emphasis on the hospitality industry. Material presented considers cultural, geographic, economic, historical, political, and social contexts within which the business functions. The course is conducted in French, emphasizing a conversational approach. Specialized situations and vocabulary are used in building general competence in practical usage.

H ADM 364 Advanced Business Writing
Fall or spring. 3 credits. Limited to 20 juniors, seniors, or graduate students, and others with written permission of the instructor. Prerequisite for undergraduates: H Adm 165 (for hotel school students) or completion of student's freshman writing requirement. Elective.
W 12:20–2:15. D. Jameson, S. Kiner.
Focuses on the written communications that demand special persuasiveness and control of tone. Writing assignments will give students a chance to apply the theories of communication, semantics, and human relations covered in the course. The kinds of communications that will be analyzed, evaluated, and written include persuasive messages to subordinates and superiors in an organization; sales letters and other promotion materials; and negative messages such as refusals, rejections, and responses to complaints. A major topic is the planning and executing of a job-hunting campaign, for which students prepare résumés, letters of application, and follow-up messages adapted to their individual needs.

H ADM 365 Managerial Communication: Principles and Practices
Fall or spring. 3 credits. Limited to 24 juniors and seniors per lecture, or written permission of the instructor. (Because of the strict class-size limitation, a student who chooses to drop this course should notify the instructor no later than the end of the first week of class so another student can fill the opening.)
Prerequisites: H Adm 165 and H Adm 212.
Required.
Lec 1, T R 10:10–11:40; lec 2, T R 10:10–11:40; lec 3, T R 12:20–1:50; lec 4, T R 2:30–4; lec 5, M W F 11:15. J. Brownell, D. Flash, S. Kiner, E. Huettman, and faculty.
A broad study of communication in a management context. Emphasizes the significant role of communication in developing work relationships that enable managers to achieve their goals. It presents the theories and principles of communication that underlie effective performance. Students increase their individual communication abilities by applying these concepts in a variety of managerial contexts, including interacting one-to-one, working in groups, and formally developing and presenting ideas to larger audiences.

[H ADM 562.01 Special Topic: Persuasive Communication in Organizations
Fall. 3 credits. Limited to 18 students. Prerequisites: H Adm 165 and 365 for hotel school undergraduates, or permission of instructor. Elective. Not offered 1992–93.
T R 8:30–9:45. J. Brownell.]

H ADM 562.02 Special Topic: Communication and the Multi-Cultural Organization
Spring. 3 credits. Prerequisite: H Adm 365. Elective.
TBA. D. Jameson.
A critical review of the influence of culture, perception, power, and gender on inter- and intracultural encounters in organizations characterized by multiculturalism. Topics include socialization, language and culture/subculture, ethnocentrism, stereotypes, verbal and nonverbal symbol systems, similarities, and differences between cultures.

H ADM 761 Organizational Communication for Managers
Spring. 3 credits. Elective.
T R 8:40–9:55. J. Brownell.
Focuses on the complex interactions that occur when people communicate in organizations. Structured around communication tasks managers must accomplish to be effective on the job. Topics include political, ethical, and psychological dimensions of business communication. Emphasis is on design of effective communication strategies. Applications and experiential exercises.

INFORMATION TECHNOLOGY COURSES

H ADM 171 Keyboarding on the Macintosh
Spring. 2 credits. Elective.
M W F 12:20. B. David.
An introduction to the computer and a beginning course in alphabetic and numeric keyboarding. Students learn word-processing skills during the second half of the course.

H ADM 174 Microcomputing
Fall. 3 credits. Limited to hotel school first-semester freshmen; maximum of 25 students per lecture. Spring and summer. 3 credits. Open enrollment. Required.
Lec 1, M W F 8; lec 2, M W F 9:05; lec 3, M W F 10:10; lec 4, M W F 11:15; lec 5, M W F 12:20. R. Alvarez, B. David.
An introduction to microcomputing to develop functional computer fluency. Students develop skills in four generic areas: text, graphics, spreadsheet, and list processing. The course is entirely lab-oriented and students work on Macintosh personal computers.

H ADM 374 End-User Business Computing Tools
Fall or spring. 3 credits. Elective.
M 7:30–10:30 p.m.. R. Alvarez.
Explores the personal computer as a managerial tool for the hospitality industry. Concepts of modeling, database, and end-user computing are covered. Students learn to use specific software applications programs to solve original problems. All work is done on the IBM PS2.

H ADM 375 Hotel Computing Applications
Fall or spring. 3 credits. Limited to 20 students. Prerequisite: H Adm 174. Elective. (Formerly H Adm 274.)
T R 11:15. R. Moore.
An introduction to management information systems as they currently are used in the hospitality industry. Specific topics include property management systems, reservation systems, communication networks, database structures, point-of-sale systems, methods of system selection, and cost justification. Computer laboratories provide hands-on experience with systems widely used in the hospitality industry and help to develop IBM PC/DOS skills.

H ADM 474 Corporate Information Systems Management
Spring. 3 credits. Limited to juniors, seniors, and graduate students who have not taken H Adm 774.
M W 10:10–11:25. R. Alvarez.
Explores ten key issues in information technology management through use of case studies of companies with relevant experience with the issues. A basic understanding of information technology, organizational behavior, and general management is advised.

[H ADM 571 Analysis and Design of Information Systems
Fall. 3 credits. Not offered 1992-93. Elective.
R. Alvarez.
For students who may become involved with the analysis and design of computer-based information systems (CBIS). The course is intended to develop competence and confidence in the participants' ability to plan for CBIS, specify their functional design, manage a systems adoption project, deal with system vendors, and function as organizational consultants on CBIS. The course assumes an elementary working knowledge of management information systems and basic business. The course is pragmatic and requires participant teams to analyze and design (and possibly build and test) a software application system.]

H ADM 572 Development of Decision Support Systems Through Data Integration, Computing Tools, and Networking
Fall. 4 credits. Limited to juniors, seniors, and graduate students. Prerequisite: H Adm 374 or permission of the instructor. Elective.
M W 11:15–12:05. R. Moore.
Students learn to use tools to integrate data from hotel transaction processing systems and build models that form the basis of decision support systems and executive information systems. Local area networks, E-mail systems, database and presentation software are introduced. Software applications are used to access networks, query distributed databases, and build numerical and graphical models. All work is on IBM PS/2's and IBM AS/400's.

H ADM 774 Computers and Hotel Computing Applications
Spring. 3 credits. M.P.S. Requirement.
M W F 10:10. R. Moore.
The physical and technical computing environments in a multi-unit hospitality corporation. Information systems are viewed from various perspectives, i.e., as data-processing systems, management information systems, and decision support systems. The role of information systems in a strategic planning framework is explored. Organizational and infrastructural issues that enhance or detract from system success are explained.

LAW COURSES

[H ADM 385 Business Law I
Spring. 3 credits. Limited to juniors, seniors, and graduate students outside the hotel school, and hotel students by permission of the instructor. Elective. Not offered 1992–93.
M W 11:15. J. Sherry.
Designed to enable students to acquire a basic understanding of law and legal relationships in a business context. Variety of topics aid in making decisions as an executive with managerial responsibilities.]

H ADM 387 Business and Hospitality Law
Fall or spring. 3 credits. Limited to juniors, seniors, and graduate students. Required.
M W 9:05. Faculty.
An integrated chronological presentation of contract, agency, and tort concepts as they apply to the legal aspects of hospitality management. Appropriate federal, state, and local cases, statutes, and other materials are examined. The overall objective is to recognize, analyze, and evaluate legal issues for the purpose of making and articulating appropriate decisions.

H ADM 487 Real Estate Law
Summer. 3 credits. Recommended: completion of H Adm 450 or equivalent. Elective.
Hours to be arranged. J. Sherry.
Laws governing the acquisition, ownership, and transfer of real estate, beginning with the purchase and sale of a family residence and leading to more-complex transactions involving hotels, motels, condominiums, cooperatives, syndications, and real-estate trusts. Financing aspects, including construction and building loans, mortgages, and mortgage foreclosures are treated from the viewpoint of lender and borrower. The legal relations of landlord and tenant are given special attention, and typical hotel and motel leases are dissected and scrutinized. Applicable tax considerations are focused on all transactions.

H ADM 781 The Interplay of Law and Ethics in Service Industry Management
Fall. 3 credits. Limited to 50 hotel graduate students; seniors and other graduate students by permission of instructor only. Prerequisites: completion of all required hotel school M.P.S. core courses, or permission of instructor.
M 11:15; F 11:15–1:10. J. Sherry.
Involves students in ethical aspects of traditional law problems confronting service industry managers and executives within the areas of commerce, consumerism, administrative law and practice, regulation of anti-competitive marketing activities, and federal securities regulation. The impact of the corporation on traditional notions of personal social responsibility will be stressed.

OTHER COMMUNICATION, INFORMATION TECHNOLOGY, LAW, AND QUANTITATIVE METHODS COURSES

H ADM 191 Quantitative Methods
Spring. 3 credits. Prerequisite: H Adm 174. Required.
T R 11:55–1:10. S. Kimes.
An introduction to statistical and operations research methods appropriate to the hospitality industry. Topics include descriptive statistics, probability, correlation and regression, forecasting, and queuing. The emphasis will be on practical applications of the techniques to hospitality related problems.

H ADM 192 Introduction to the Hospitality Industry
Spring. 2 credits. Limited to non-hotel students and hotel freshmen. Elective.
R 2:30–4:25. T. Kelly.
Presents a comprehensive overview of the size, scope, and evolution of the global hospitality industry. The various segments of the lodging, food and beverage, travel, tourism, and leisure time industries will be examined, with emphasis on historical development, current and future economic impact, role in society, and career opportunity potential.

H ADM 490 Housing and Feeding the Homeless
Fall and spring. Variable to 4 credits. Limited to 21 students. Prerequisites: H Adm 303 and 325, or permission of instructor. Elective.
T R 11:55–1:10. A. Hales, J. Eyster.
Explores the public and private sector partnership in addressing the crisis of homelessness. Through lectures, class discussions, research, volunteerism, and a field placement practicum, students will explore the economic, social, and political issues of our country's growing concern with housing and feeding homeless people. Students will study the history of homelessness and the strategies to prevent and alleviate the problem. The components of successful housing programs and food assistance programs will be analyzed.

Students taking the course for four credit hours will, in small groups, work with agencies providing services to homeless persons. They will analyze the agency's mission, its opportunities and constraints, identify a specific managerial challenge, and formulate an approach and solution to that challenge. This fieldwork will require approximately eight days during the semester.

Students taking the course for three credit hours will research and write a term paper about some aspect of homelessness and volunteer with a service agency twelve hours during the semester.

H ADM 491 Tips for Success: Business Etiquette and Hospitality Services in the Hospitality Arena
Spring. 2 credits. Limited to juniors, seniors, and graduate students. Elective.
M 1:25–3:25. C. Muller.
Designed to expose students to various international and national business cultures, traditions, lifestyles, social graces, and business practices, enabling them to more effectively perform in today's global business market. The course will give students fundamental skills and cultural sensitivities

paramount to managing and working well with a broad group of people.

H ADM 492 Current Topics Seminar
Fall. 3 credits. Limited to 20 students. Elective.
T R 11:55–1:10. J. Clark.
A seminar approach to discuss readings and case studies selected to illustrate current challenges and future trends such as globalization, consolidation, etc. in the hospitality industry. Futuristic view from a multi-unit corporate perspective. Analysis of companies, case studies, and guest lectures. Student teams will research new topics and make presentations and final reports.

H ADM 591 Operations Management in the Hospitality Industry
Fall. 3 credits. Prerequisite: H Adm 191 or equivalent. Elective.
T R 10:10–11:25. S. Kimes.
An introduction to the area of operations management and its application to the hospitality industry. Service design, process design, layout analysis, overbooking, yield management, work sampling, and quality management will be studied through lecture, discussion, cases, and projects. Intended for undergraduate students.

H ADM 592 Service Operations Management
Fall. 3 credits. Limited to 25 graduate students. Prerequisite: H Adm 791 or equivalent. Elective.
T R 2:30–3:45. S. Kimes.
The objective of this course is to improve the understanding of the operations function of service organizations. The course focuses on the role and nature of service operations, the relationship of operations to other business functions, and develops skills and provides techniques for the effective management of service operations. Topics include service design, bottleneck and layout analysis, capacity management, work force management, and quality management. Intended for graduate students interested in services management.

[H ADM 599 Development and Management of Wellness in Business Organizations
Spring. 3 credits. Limited to juniors, seniors, and graduate students. Field trip, $25–50. Elective. Not offered 1992–93.
T R 8:40–9:55. M. Tabacchi.
Design, implementation, and evaluation of wellness programs in organizations. Stressors that may cause illness are examined. Case studies and guest speakers from the industry address diagnosing the employee population, sustaining employee participation, evaluating cost/benefit aspects of wellness programs, and choosing alternative health-insurance strategies.]

H ADM 791 Graduate Quantitative Methods
Spring. 3 credits. M.P.S. requirement.
T R 10:10–11:25. S. Kimes.
An introduction to management-science models and statistical techniques applicable to the hospitality industry. The application of specific quantitative methods to decision making in the hospitality industry. Topics include forecasting, decision analysis, linear programming, probability, and queuing. Computer software packages will be used to facilitate the decision-making process.

INDEPENDENT RESEARCH COURSES

H ADM 600-690 Undergraduate Independent Study
Fall or spring. Variable credit. Prerequisite: written permission. May be conducted in any academic area of the school under the direction of a faculty member. Credit generally is in free electives and may not count toward the concentration except by petition. Credit may not be earned when equivalent material is offered in a regular course nor for teaching assistantships. Applications available in Student Services Office. Elective.

H ADM 600 Undergraduate Independent Study in Management Operations

H ADM 601 Management Intern Program I—Operations
6 credits.

H ADM 602 Management Intern Program II—Academic
6 credits.

H ADM 603 Hotel Ezra Cornell

H ADM 610 Undergraduate Independent Study in Human Resources Management

H ADM 620 Undergraduate Independent Study in Financial Management

H ADM 630 Undergraduate Independent Study in Food and Beverage Management

H ADM 640 Undergraduate Independent Study in Marketing and Tourism

H ADM 650 Undergraduate Independent Study in Properties Management

H ADM 660 Undergraduate Independent Study in Communication

H ADM 670 Undergraduate Independent Study in Information Technology/ Computers

H ADM 680 Undergraduate Independent Study in Law

H ADM 690 Undergraduate Independent Study in Quantitative Methods

H ADM 700–900 Graduate Independent Research
Fall or spring. Variable credit. Limited to graduate students. Prerequisite: written permission of instructor. Students should obtain a permission form from the hotel school's graduate office.
As appropriate, graduate students enroll in these courses for thesis or monograph research or for other independent directed study. Students must have in mind a project and obtain agreement from a faculty member to oversee and direct the study.

H ADM 700 Graduate Independent Research in Management Operations

H ADM 710 Graduate Independent Research in Human Resources Management

H ADM 720 Graduate Independent Research in Financial Management

H ADM 730 Graduate Independent Research in Food and Beverage Management

H ADM 740 Graduate Independent Research in Marketing and Tourism

H ADM 750 Graduate Independent Research in Properties Management

H ADM 760 Graduate Independent Research in Communication

H ADM 770 Graduate Independent Research in Information Technology/ Computers

H ADM 780 Graduate Independent Research in Law

H ADM 790 Graduate Independent Study in Quantitative Methods

H ADM 802 Master of Science Thesis Research

H ADM 803 Graduate Teaching Internship

H ADM 805 M.P.S. Monograph I

H ADM 806 M.P.S. Monograph II

H ADM 900 Doctoral Thesis Research

FACULTY ROSTER

Professorial

Arbel, Avner, Ph.D., New York U. Prof.
Bell, Russell A., Ph.D., Kansas State U. Assoc. Prof.
Berger, Florence, Ph.D., Cornell U. Assoc. Prof.
Brownell, Judith, Ph.D., Syracuse U. Assoc. Prof.
Carvell, Steven A., Ph.D., SUNY Binghamton. Assoc. Prof.
Chase, Robert M., M.B.A., Cornell U. Prof.
Clark, John J., Jr., Ph.D., Cornell U. Prof.
Corgel, John B., Ph.D., U. of Georgia. Assoc. Prof.
Cullen, Thomas, Ph.D., Cornell U. Assoc. Prof.
Dev, Chekitan S., Ph.D., Virginia Polytechnic. Asst. Prof.
Dittman, David A., Ph.D., Ohio State U. Dean and E. M. Statler, Professor.
Dunn, David C., Ph.D., Cornell U. Assoc. Prof.
Enz, Cathy A., Ph.D., Ohio State U. Assoc. Prof.
Eyster, James J., Ph.D., Cornell U. Hospitality Valuation Services Professor of Finance and Real Estate
Ferguson, Dennis H., Ph.D., Cornell U. Assoc. Prof.
Fulford, Mark D., M.S., Auburn U. Asst. Prof.
Geller, A. Neal, Ph.D., Syracuse U. Prof. and Graduate Faculty Representative
Hales, E. Ann, Ph.D., Cornell U. Asst. Prof.
Jameson, Daphne A., Ph.D., U. of Illinois. Assoc. Prof.
Kaven, William H., Ph.D., Cornell U. Prof.
Kelly, Thomas J., M.S., Cornell U. Assoc. Prof.
Kimes, Sheryl E., Ph.D., U. of Texas. Asst. Prof.
Lundberg, Craig C., Ph.D., Cornell U. Blanchard Professor of Human-Resources Management
Marler, Janet H., M.S., Cornell U. Asst. Prof.
Moore, Richard G., M.B.A., Cornell U. Assoc. Prof.
Morgan, Michael S., Ph.D., U. of Texas. Asst. Prof.
Mutkoski, Stephen A., Ph.D., Cornell U. Banfi Vintners Professor of Wine Education and Management

Penner, Richard H., M.S., Cornell U. Prof.
Rainsford, Peter, Ph.D., Cornell U. Assoc. Prof.
Redlin, Michael H., Ph.D., Cornell U. Assoc. Dean and Prof.
Renaghan, Leo M., Ph.D., Pennsylvania State U. Assoc. Prof
Sherry, John E. H., J.D., Columbia U. Prof.
Stipanuk, David M., M.S., U. of Wisconsin. Assoc. Prof.
Tabacchi, Mary H., Ph.D., Purdue U. Assoc. Prof.

Adjunct, Visiting, and Other Teaching Staff

Alvarez, Roy, M.Ed., Lecturer
Blanchard, Kenneth, Ph.D., Visiting Assoc. Prof.
Brooks, Earl, M.A., Professor Emeritus
Chernish, William N., Ph.D., Lecturer
D'Aprix, David, B. A., Lecturer
David, Betty B., Lecturer
deRoos, Jan A., M.S., Cornell U., Lecturer
Ferris, J. David, M.A., Visiting Lecturer
Flash, Dora G., A.B., Senior Lecturer
Gould, Shelly, B.S., Teaching Support Specialist
Hisle, James E., B.S., Robert A. Beck Chair of Applied Hotel Management
Huettman, Elizabeth, Ph.D., Lecturer
James, Robert, M.B.A., Visting Lecturer
Kiner, Susan W., M.A., Lecturer
Lang, Barbara, B.S., Lecturer
Lumley, Jane, M.A., Senior Lecturer
Muller, Christopher C., M.P.S., Lecturer
Nash, Abby, B.A., Visting Lecturer
Neuhaus, Thomas W., M.S., Lecturer
Noden, Malcolm A., Senior Lecturer
Norkus, Gregory X., M.S., Senior Lecturer
O'Connor, Therese A., M.S., Senior Lecturer
Pezzotti, Giuseppe G. B., B.S., Lecturer
Richmond, Bonnie S., M.S., Senior Lecturer
Ridley, Jane S., B.A., Teaching Support Specialist
Sciarabba, Andrew, B.B.A., Visiting Lecturer
Snow, Craig, Ph.D., Lecturer
Spies, Rupert, Studienassessor, Lecturer
Weaver, Loren E., B.S., Teaching Support Specialist
Weisz, Stephen, B.S., Visiting Lecturer
White, Robert, A.O.S., Teaching Support Specialist
Whitehead, Donald E., B.S., Visiting Lecturer
Yesawich, Peter C., Ph.D., Visiting Assoc. Prof.

NEW YORK STATE COLLEGE OF HUMAN ECOLOGY

ADMINISTRATION

Francille M. Firebaugh, dean

Charles McClintock, associate dean

Lucinda A. Noble, associate dean; director of Cornell Cooperative Extension

Carol L. Anderson, assistant dean; associate director of Cornell Cooperative Extension

Christine Olson, assistant dean; assistant director, Cornell University Agricultural Experiment Station

Brenda Bricker, director, admissions

Mary Rhodes, registrar and director, student services

FACILITIES

The College of Human Ecology, through its teaching, research, and extension programs, seeks to understand and improve the relations of people to their environments, especially to those settings most critical for growth and development—home, school, work, and leisure. Faculty and students examine individuals in relation to their family, neighborhood, workplace, and community, seeking a balance between theory and practice that will improve the quality of everyday life.

The college is housed in Martha Van Rensselaer Hall. The Division of Nutritional Sciences, an intercollege division supported jointly by this college and the College of Agriculture and Life Sciences, has space in Savage Hall and in Martha Van Rensselaer Hall.

The buildings include administrative and faculty offices, classrooms, auditoriums, and lecture halls; wet chemistry and biochemistry laboratories for nutrition, food science, and textile science; experimental food laboratories; design studios and a computer-aided design laboratory; woodworking shops; experimental observation rooms with one-way vision screens and sound-recording equipment; educational television studios; and a printing and reproduction facility. Also included are learning resource centers for career planning and academic study, a historical costume collection, a human metabolic research unit, a research animal facility, cold rooms, a constant temperature and humidity laboratory, and an experimental nursery school.

Specialized equipment for teaching and research includes biochemical and chemical instruments for spectroscopy, chromatography, radioisotope analysis, electrophoresis, microscopy, and ultracentrifugation; physical testing equipment; and cameras, videotape, and sound recording equipment.

DEGREE PROGRAMS

	Degree
Biology and Society	B.S.
Consumer Economics and Housing	B.S.
Design and Environmental Analysis	B.S.
Human Development and Family Studies	B.S.
Human Service Studies	B.S.
Nutritional Sciences	B.S.
Policy Analysis	B.S.
Textiles and Apparel	B.S.
Individual Curriculum	B.S.

DIVISION OF STUDENT SERVICES

Brenda Bricker, director, Office of Admissions

Mary Rhodes, college registrar and director, Office of Student Services

Persons interested in undergraduate study in human ecology should contact the Office of Admissions, 172 Martha Van Rensselaer Hall. Those interested in graduate study should contact the graduate field representative identified among the faculty of each department. Department faculty are listed at the beginning of the course descriptions for each department.

Matriculated students can find assistance with matters of academic credit, graduation requirements, academic advising, career planning and placement, and personal counseling may be obtained from the Office of Student Services, N101 Martha Van Rensselaer Hall. International students should contact their student counselor in the Office of Student Services.

The Students

The College of Human Ecology undergraduate enrollment is 1,286 with 56 percent in the upper division. About 340 students are graduated each year, and last year 257 freshmen and 159 transfer students matriculated. One hundred faculty members serve as advisers for undergraduates.

The college's undergraduate admissions committee selects applicants who are academically well prepared and appear most likely to profit from the college's various curricula. Admission is selective.

Approximately 67 percent of the student body comes from New York State, with the remainder from other parts of the United States and abroad. Twenty-one percent were identified as members of minority groups in 1991.

Approximately 200 graduate students have members of the college's faculty chairing their special committees. The college awarded 47 master's degrees and 28 doctorates last year.

ACADEMIC PROGRAMS

Majors

Each department offers a major, and within most departmental majors there are specific options. The college also offers two interdepartmental majors. Selecting a major means choosing one option in one department. Although a student may satisfy the requirements of more than one major option, he or she is officially certified to graduate under only one. (The college urges students who satisfy more than one major or option to make note of this in the credentials they file in the university's Career Center and to seek recommendations from faculty associated with the options completed.) Majors include the following options.

Consumer Economics and Housing (CEH): The department supervises the department major and the policy analysis major.

Design and Environmental Analysis (DEA): Interior design, facility planning and management, human environment relations.

Human Development and Family Studies (HDFS): Does not have separate options. Courses focus on cognitive, social, and personality development; phases of development; and family studies and life course. The department administers an honors program for selected students.

Human Service Studies (HSS): Does not have separate options. Courses focus on three content clusters: human service environments, programs, and processes. A professional internship and senior seminar are required. Students may meet the requirements of an accredited bachelor's degree program in social work.

Nutritional Sciences (NS): The department supervises the department major. (By careful planning, students may also meet the minimum academic requirements of The American Dietetic Association.) The department administers an honors program for selected students.

Textiles and Apparel (TXA): Apparel design, apparel-textile management, fiber science.

Interdepartmental Major in Biology and Society (ID-BS).

Interdepartmental Major in Policy Analysis (ID-PA).

Individual Curriculum: It is possible to develop an individual program of study if none of the above programs fits particular educational and career objectives.

Changing Majors

Because any student's interests and goals may change as new options emerge, the college provides ways for students to change their majors. When a declared major no longer seems to meet a student's educational goals, a counselor or faculty adviser may be able to point out alternatives. If the student decides to make a change, a change-of-major form

(available from the Office of Student Services, N101 Martha Van Rensselaer Hall) ensures that the change is sent to the department in which the student wishes to major, so an adviser can be assigned to the student.

Students of Mature Status

The college recognizes that students who interrupted their formal education and are returning to school have needs different from those of the average undergraduate. To facilitate the education of mature students, defined as those twenty-four years old or older at matriculation, the college has adopted certain procedures specifically for that group.

Mature students are permitted to enroll for as few as 6 credits without petitioning and are also permitted to extend their residency beyond the normal eight terms.

It is highly recommended that mature students contact the director of the Continuing Education Information Service, B12 Ives Hall, for information on resources available through that office.

Special Students

Students eligible for special status are those visiting from other institutions and interested in particular programs in the college; those with a bachelor's degree preparing for graduate study or jobs and careers in human ecology–related fields; or those who have interrupted their education and are considering completing degree programs. Students accepted in the non-degree status of special student may enroll for a maximum of two semesters. During the second semester of attendance, a special student must either apply for admission as a transfer or plan to terminate studies in the college at the end of the semester.

Special students are expected to take a minimum of 12 credits each semester and to take one-half to two-thirds of their work in the state divisions of the university. Work taken while a person is classified as a special student may be counted toward the requirements of the bachelor's degree.

Empire State Students

Occasionally a student who is completing requirements for a degree through the Empire State College Program is interested in taking a human ecology course. This can be done by registering through the Division of Summer Session, Extramural Study, and Related Programs, B12 Ives Hall. All rules of the extramural division apply, and registrations will be accepted only on a space-available basis and with the written approval of the course instructor.

At the time of registration, Empire State College students provide the extramural division with a completed copy of Empire State College's notification of cross-registration form number, SA-22, F-031, to verify enrollment in Empire State College. Such students will be charged 25 percent of the standard extramural tuition per credit.

CONSUMER ECONOMICS AND HOUSING

The behavior of people as consumers and family members and their interactions with private markets and public sectors of the economy are increasingly important as the economy becomes more service-based. One result has been an increasing demand from business and government for trained individuals who understand consumers, families, the markets in which they deal, and how public policies affect the markets and through them consumers and families. The demand has been sufficient to elevate salaries for well-trained individuals.

The consumer economics and housing major provides such training. The major combines economics with statistics, sociology, and family resource management to study how consumer markets work, how firms and consumers behave, the role governments play in consumer protection, how functions shift between households and markets as prices, incomes, social values, and legislation change, and how changes in the family affect consumer markets. Students interact with the faculty and with each other both in the classroom and in field-based learning experiences in the Ithaca area, New York City, Washington, or abroad.

Graduates in consumer economics and housing are prepared for a wide variety of consumer- and family-related positions in business and government. The major also provides an excellent foundation for further studies in economics, law, graduate business, and policy analysis.

The consumer economics and housing major is flexible. Students are assigned a faculty adviser by the advising coordinator unless the student wants a particular adviser. The earlier the decision to major in CEH is made, the greater the freedom to develop a program to meet individual educational or career goals. Transfer students are urged to discuss their plans with a faculty adviser as soon as possible. An appointment may be made directly with an adviser or with the advising coordinator, Peter Zorn.

DESIGN AND ENVIRONMENTAL ANALYSIS

The Department of Design and Environmental Analysis (DEA) is concerned with planning, designing, and managing interior environments to satisfy human needs. Most people spend over 90 percent of their lives inside buildings. Those settings have substantial and far-reaching effects on the quality of our lives. The processes for creating and maintaining the built environment face enormous challenges. These include frequent social and organizational change, technological advances, new building methods, and finite resources. The program in DEA is dedicated to preparing professionals who can meet these challenges.

Diverse faculty backgrounds and teaching approaches help students to develop their multidisciplinary problem-solving and creative abilities, aesthetic judgment, and analytical thinking. Excellent laboratory, shop, studio, and computer facilities permit exploration of innovative concepts for the design and management of interior environments. The relationship between people and their physical surroundings is explored through a combination of academic courses, field experience, and applied research. Examples of student class projects and faculty work are frequently on display in the department's gallery. The DEA Resource Center includes books, journals, newsletters, and materials samples for student use.

Options

The department offers undergraduate education in three professional areas: interior design, facility planning and management, and human-environment relations. The interior design option is accredited by the Foundation for Interior Design Education Research (FIDER).

To take full advantage of the course sequences and electives, it is important to select an option as early as possible. This is particularly true in the interior design option. Transfer students in the interior design option may need one or two extra semesters to complete the program.

Option I: Interior Design

The interior design option prepares students for professional careers in the planning and design of interior spaces and associated products. The program emphasizes a problem-solving approach based upon knowledge of buildings and their associated systems, furnishings and interior products, human-environment relations, and design principles. Some students combine this program with one of the other options.

Careers are available in interior design and space planning, interior architecture, facility planning, interior product design, and housing. This program also serves as an excellent preparation for graduate study in interior design, facility management, architecture, and product design.

Option II: Facility Planning and Management

This option is designed to prepare students for professional careers in facility management. The program focuses on the planning, design, and management of facilities for large, complex organizations such as corporations, health-care institutions, research and development laboratories, and universities. Facility planning and management is a basic management function that coordinates and integrates information and expertise from areas such as planning and design, real estate and business administration with human factors, ergonomics, environmental psychology, telecommunications, and building operations for the purpose of developing and managing facilities that support individual and organizational effectiveness.

Excellent career opportunities exist in the facility management divisions of private companies, institutions, the health-care industry, and with private consulting firms offering facility management services. The program is also a good preparation for graduate study in business, planning, or one of the design disciplines and for advanced study in facility planning and management.

Option III: Human-Environment Relations

Human-environment relations focuses on the interaction between people and their physical surroundings. This option seeks to expand understanding of how the environment affects human perception, cognition, motivation, performance, health, safety, and social behavior, and to use that knowledge to help architects, planners, interior designers and product designers to plan, design, and manage safe and effective environments. The effect of human capabilities or characteristics such as family structure, life-style, social class, and stage in life cycle on environmental needs and requirements is also a focus of the program. Career opportunities are available in design firms and in urban planning and other public agencies as well as in the facility management and product design division of private companies. Human-environment relations is good preparation for graduate study leading to a Ph.D. degree in the social sciences and a career in academic or other research-oriented settings in either the public or private sector. It can also serve as the basis for graduate study in an environmental planning or design discipline such as architecture, facility planning and management, interior design, landscape architecture, or city and regional planning. Electives in the social sciences and in research methods and statistics are encouraged.

Academic Advising

All DEA majors are matched with a faculty adviser during their first semester by advising coordinator Michael Boyd, in E206 Martha Van Rensselaer Hall.

Consultation with faculty advisers about future goals, departmental requirements, sequences of courses, and electives inside or outside the college to meet special needs helps students develop their programs. Students majoring in interior design, especially, must begin early to plan and collect materials for a portfolio of their work, which is necessary for many positions and for application to graduate schools. Faculty advisers can make recommendations on what to include. Students are free to change advisers. Although advisers must sign the schedule card during course enrollment each term, it is the student's responsibility to keep track of his or her courses and to make sure that the program meets graduation requirements for the major and the college.

Ownership and Exhibition of Student Work

All design work done in studios as part of an academic program is the property of the department until it has been released by the instructor. The department is not responsible for loss or theft of student work.

HUMAN DEVELOPMENT AND FAMILY STUDIES

The programs of the Department of Human Development and Family Studies (HDFS) are concerned with how people develop throughout the life course. Of equal interest is the family as a context for individual development and as a part of the larger structure of society. An ecological perspective—the person in interaction with complex biological, situational, and environmental conditions of everyday life—is featured in many departmental courses.

Major social science disciplines concerned with the development of individuals and with the structure and function of families are represented among faculty members with backgrounds in psychology, sociology, history, and education. The department's programs of instruction, extension, and research provide diverse opportunities for students to prepare for career development or to acquire the bases for graduate study. Many of the department's majors are interested in clinical psychology, counseling, law, medicine, special education, or university teaching and research that require some graduate study. Others may go directly into employment in business or industry or take bachelor's-level positions as youth counselors, day-care workers, personnel assistants, research technicians, social program assistants, etc.

Academic Advising

Every HDFS major is assigned a faculty adviser in the department, and advising conferences are required at least twice a year. An adviser helps plan the course work and consults with the student about career options. The adviser can also help students find special opportunities for individual study or for experience outside the classroom. Although advisers must sign course schedule cards, it is the student's responsibility to keep track of his or her courses and to make sure that the program meets graduation requirements for the major and the college. Students who need an adviser or who want to change advisers for any reason should check with the department office, in NG14 Martha Van Rensselaer Hall.

Curriculum

HDFS majors usually combine a broad liberal education with a more specialized focus on either a problem of human concern or a substantive area of concentration. Areas of specialization available within HDFS include infant, child, adolescent, and adult development; abnormal development; family studies; and social-personality and cognitive development. Some students combine an HDFS major with premedical or prelaw training or with specialized work in an area outside the department, such as communication arts, nutrition, business, or government.

During their first two years, students are expected to combine a variety of liberal arts courses with HDFS core courses HDFS 115 (Human Development); HDFS 150 (Families and the Life Course); and intermediate courses in phases of development, cognition, or social-personality. This encourages diversity yet ensures a common base for upper-level courses in the major. Courses within the department vary from lectures and discussions to research and independent study.

All students are encouraged to participate in an experiential learning course in their particular area of interest. The course may focus on a naturalistic or laboratory setting (e.g., nursery school, youth detention center, retirement home) or on a research setting (e.g., interviewing, administering tests, observing behavior).

An HDFS major also takes a number of upper-level departmental courses in particular areas as described in the Student Guide. Additional information is available in the HDFS Office of Undergraduate Education, NG14 Martha Van Rensselaer Hall.

Math Requirement

HDFS majors are required to fulfill a math requirement by passing Education 115 or demonstrating equivalent competency by scoring 650 or higher on the math SAT examination.

Teaching Certification Option

The cooperative Cornell HDFS–State University College at Cortland education program is designed to meet New York State certification requirements for teaching grades N–6 while simultaneously earning the Cornell bachelor's degree in HDFS. The program requires that the student spend three years at Cornell and the senior year and part of two summers registered in absentia at SUC Cortland. Students keep their Ithaca housing, since Cortland is just 18 miles away and the one-semester teaching internship is based in Ithaca.

This highly selective undergraduate program offers an alternative to the option of seeking a master's degree in education after the undergraduate studies at Cornell have been completed. Students interested in the program should discuss the merits of each option with the Coordinator of Undergraduate Education in NG09 MVR.

Course work at Cornell must be carefully planned. Elective options will be somewhat limited because it will be necessary to consider the twenty-seven Cortland credits plus three education courses at Cornell as electives. More information is available in the HDFS Office, NG14 Martha Van Rensselaer Hall.

Honors Program

The honors program leading to a Bachelor of Science degree with honors in HDFS is designed to provide in-depth research experience for students interested in graduate school and to challenge students who enjoy research. Interested students should consult the coordinator of the honors program during their sophomore year.

A grade-point average of 3.3 is recommended for entry into the program, although promising students who lack the grade-point average also may apply if they can otherwise demonstrate their potential for honors work. Honors students must take an approved course in research design, preferably in the sophomore or junior year.

Students spend part of their junior and senior year working on a thesis under faculty supervision, completing the project before March 15 of the senior year when the student's oral examination is held. More information is available in the department's Office of Undergraduate Education, NG14 Martha Van Rensselaer Hall.

Language Competency

The HDFS faculty believe that competence in a foreign language is an essential liberal arts goal for the educated HDFS student. Such exposure opens another culture for explora-

tion at both the instrumental and expressive levels, helps students understand language itself, and encourages knowledge of language as a fundamental intellectual tool and as an essential communicative asset with potential applied benefits. While this is not a graduation requirement, it is strongly recommended that HDFS majors develop competency in a second language.

The following departments teach foreign languages or literature or both in the College of Art and Sciences: Africana Studies and Research Center, Asian Studies, Classics, German Literature, Modern Languages and Linguistics, Near Eastern Studies, Romance Studies, and Russian Literature.

Work toward foreign language competency should be undertaken in the freshman and sophomore years. Please note that high school or transferred language courses can be used for advanced standing credit, even if the student does not want to do any further language work at Cornell.

Speakers of languages other than English may be awarded credit for their bilingual ability. Their English achievement is measured by the Test of English as a Foreign Language (TOEFL), a requirement for matriculation. Their performance in one other language learned outside the academic environment is measured by examination, and evidence of abilities in reading and writing, as well as speaking, is required. A maximum of 6 advanced placement credits are granted to students who demonstrate PROFICIENCY equivalent to course work at the 200 level or above at Cornell. Students may not earn credit both for PROFICIENCY in their native language and for studying English as a second language at Cornell.

Language Course Placement and Credit

Students who have had two or more years of high school study in a language may not register in any course in that language without being placed by examination. Nor may transfer students register without examination, even though they may have been given credit for language work elsewhere.

The type of examination depends on the language course and the level of achievement:

1) French, German, Italian, Russian, and Spanish courses: the standardized College Placement Test (CPT). Entering students who have not taken the CPT in high school and who want to continue their language study must take the CPT at Cornell during orientation week. Students may retake this examination at Cornell if they have studied the language a year or more since last taking the test. To do this, students register with the Academic and Career Counseling services, 203 Barnes Hall, and pay a fee.
2) Latin (all courses except 105 and 107): departmental examination.
3) Greek (all courses except 101, 104, and 111): departmental examination.
4) Arabic: departmental examination.
5) Hebrew: departmental examination.
6) Other languages: special examinations: see the professor in charge.
7) High achievement (students with a CPT score of 650 or better in French, German, Hebrew, Italian, Russian, and Spanish): the Cornell Advanced Standing Examination (CASE).

An entering or continuing student with high achievement scores should take the Cornell Advanced Standing Examination (CASE).

See section on College of Arts and Sciences, Language Requirement, for further information.

HUMAN SERVICE STUDIES

Faculty in the Department of Human Service Studies (HSS) prepare students for a variety of careers in programs that serve individuals, families, and the community. HSS graduates work in schools, social services, Cooperative Extension, health and mental health programs, and community development agencies.

They are employed in such positions as counselors, school teachers, social workers, community educators, planners, and researchers. Many HSS graduates pursue graduate study in law, education, medicine, social work, health, and a variety of social sciences. HSS majors come from diverse backgrounds, but they share a common goal of wanting to serve the needs of others.

HSS is unique in that it integrates a broad spectrum of courses offered by several departments and colleges and focuses them for professional practice in the human services. All HSS students take courses that provide a knowledge base in three content clusters:

1. Human service environments – course choices provide students with knowledge about the working context within which the human service provider functions, including a base in social psychology, group and organizational behavior, social system perspectives, power and leadership.
2. Human service programs – courses for this requirement are selected to provide the student an introduction to historical and current program models, barriers to service delivery, developments in health, education and social welfare—all in the context of both the client and the work done by the human service professional.
3. Human service processes – courses for this requirement are designed to provide students with methods to work effectively in human service programs and environments. Courses include planning and development content, program delivery modes, decision-making processes, basic social planning methods, and program evaluation.

All students take a professional internship and an integrative senior seminar. Regardless of their specific career goals, students acquire a broad understanding of human services and the ways they can collaborate to improve the human condition. In addition, students specialize in an area of concentration such as health, education, social welfare, policy, planning, or evaluation.

Academic Advising

It is important for a student who is interested in majoring in Human Service Studies to declare that major as early as possible. Once that is done, students work with their assigned faculty advisers to plan course work and related educational activities. Students are free to change advisers. Although faculty advisers must sign the schedule card during course enrollment each term, it is the student's responsibility to keep track of courses and make sure that the program meets graduation requirements of the major and the college.

Social Work Program

The undergraduate social work major at Cornell has as its principal educational objective the preparation of students for beginning professional social work practice. In addition, the major prepares students for graduate education in social work and contributes to the enrichment of a college education by helping students understand social welfare needs, services, and issues.

The social work program is accredited by the Council on Social Work Education. Students who complete all requirements are eligible to apply for beginning-level employment as professional social workers or to apply for advanced standing in a graduate school of social work.

TEXTILES AND APPAREL

The Department of Textiles and Apparel (TXA) focuses on the use of textiles and fibrous materials for apparel, durable and nondurable household goods, composites, geotechnical, and biomedical applications. Programs in the department, in keeping with the overall mission of the college, emphasize the use of materials to meet human needs. The curriculum includes the application of design principles, physical and materials science, economics and marketing, government policy/regulation, management of products and their delivery, and technological developments.

Practical problem-solving skills are developed in the department's laboratories and studios. Academic course work is further enhanced by field and international experiences. Gallery space provides the setting to display design work. In addition, the Cornell University Costume Collection, housed in the department, provides a valuable resource; items from the collection are made available to students for classroom and special-study use.

Academic Advising

All TXA majors are matched with a faculty adviser by the advising coordinator, S. Kay Obendorf (208 Martha Van Rensselaer Hall). Students are strongly urged to discuss their goals, course selection and sequence, electives, and career plans with their faculty adviser. Students in apparel design must begin early to work with their advisers to develop a professional portfolio of their work. Students are free to change advisers; changes must be recorded with the advising coordinator. Although advisers must sign the schedule card during course enrollment each term, it is the student's responsibility to keep track of his or her courses and to make sure that the program meets graduation requirements for the major and the college.

Ownership and Exhibition of Student Work

All apparel design work done as part of the academic program is the property of the department until it has been released by the instructor. Certain exceptional work may be retained by the department to exhibit for academic purposes. The department is not responsible for loss or theft of student work.

Course Fees

No grade will be given in a course unless the course fee has been paid by the last week of classes.

Key Policy for Apparel Design Studios

To allow design students access to studios for out-of-class work at any hour in which Van Rensselaer Hall is open, and to provide security for the studios, the department has instituted a key policy. Each student in TXA 040, 145, 264, 367, 375, 425, 446, and 465 who submits a security deposit of $50 will be given a key to the studio in which his or her class is held. In the event that *any* key is lost, the studio will be rekeyed, and the cost will come from the security deposit of the student who lost the key. At the end of each semester, the studio will be assessed for missing and damaged equipment. The total amount assessed will be deducted from the security deposits of all students assigned to that studio. If all keys are returned and no damage or theft is reported, the security deposits will be returned at the end of the semester. Students who do not wish to work in the studio outside of class hours may elect not to have a key and therefore will not be required to submit a security deposit. Under no circumstances will these students be admitted to the studio outside of class hours.

Options

Students may select options in apparel design, apparel-textile management, or fiber science. The curriculum is based on manipulation of form, color, and the physical characteristics and structures of fabric to solve functional and aesthetic apparel problems; the application of economic and marketing principles to consumer and industry problems in the textile-apparel sector; and the study of chemical, physical, and engineering properties of fibrous structures and polymers. Depending on previous course work, transfer students may need one or two extra semesters to fulfill the requirements of the major.

Option I: Apparel Design

The study of apparel design includes both functional and aesthetic considerations in the design of body coverings. The program emphasizes a problem-solving approach that enables the student to bring a background in apparel, textiles, and human factors to the design process.

Option II: Apparel-Textile Management

Apparel and textile management combines the fields of apparel and textiles with those of economics, business management, and organizational policy. Students combine theory with case studies to find solutions to everyday problems. Course work is drawn from many interrelated disciplines, including textiles, apparel, economics, business management, and communication, as well as practical field experiences. This provides students with the experience of working with professionals from a wide variety of disciplines. Students often combine this option with either Option I (Apparel Design) or III (Fiber Science).

Option III: Fiber Science

Applications for textile structures include advanced engineering composites, protective clothing for industrial and military environments, and biomedical materials, as well as the more traditional applications found in apparel and home furnishings. The fiber science option provides a strong base in mathematics and the physical sciences combined with supporting courses in engineering, consumer economics, and the social sciences.

Career Opportunities

Graduates of programs in the Department of Textiles and Apparel have found challenging employment within the textile and apparel sector, in independent and government-sponsored research, and in community organizations. Recent graduates are working in the fields of new product development, design, management, engineering, communications, and marketing. In addition, the program prepares students for graduate or professional study in fiber and polymer science, textile marketing, apparel design, textiles, or business and management.

INTERDEPARTMENTAL MAJOR IN BIOLOGY AND SOCIETY

Biology and society is a multidisciplinary program for students with special interests in such problems as genetic engineering, environmental quality, food and population, the right to medical care, and the relation between biology, society, and ethics and/or public policy, as well as for students who plan postgraduate study in management, health, medicine, law, or other related fields.

Because the biology and society major is multidisciplinary, students must attain a basic understanding of each of the several disciplines it comprises, by including introductory courses in the fields of biochemistry, chemistry, mathematics, genetics, ecology, ethics, and history. In addition, majors are required to take core courses in biology and society, a set of electives, and a special senior seminar.

Course work in the College of Human Ecology must be taken in two of the following three concentrations: human development and the environment, health, or social policy and human services. The other basic requirements of the college must also be met. Programs incorporating those required courses are designed in consultation with a faculty adviser to accommodate each student's individual goals and interests. For further information on the major, including courses of related interest, specific course requirements, and application procedures, see the Human Ecology Student Guide.

INTERDEPARTMENTAL MAJOR IN POLICY ANALYSIS

As our economy has become more complex, so too has the role of the public sector in our society. An understanding of governmental processes and of how public policies affect the several segments of society has become more important. Individuals with the ability to evaluate government programs critically and trace their impacts quantitatively to consumers, families, business, and industry are in demand at all levels of government and business. Supervised by the Department of Consumer Economics and Housing, the policy analysis major uses the resources of the college and the university to trace and estimate government's influence in the economy.

In the policy analysis major, the student gains a basic understanding of the role of government in the economy and the political environment in which policy is made. Students concentrate on learning the economic, cost/benefit, and statistical skills necessary to evaluate the performance of government programs and policies—consumer policy, housing policy, welfare policy, environmental policy, foreign policy, for example. Because experience in legislative, regulatory, and public administration activities is helpful in providing the context for policy analysis, involvement in Field and International Study, Cornell-in-Washington, and Cornell Abroad is encouraged. The specific requirements for policy analysis are listed under the interdepartmental majors.

Graduates in policy analysis are attractive to business and industry as well as to government because of their analytical skills in economics and statistics, and their knowledge of political processes. Students also use the major for further work in policy studies, law, and business administration.

The policy analysis major is flexible and allows individual program planning. The faculty adviser assigned by the undergraduate advising coordinator can help develop a program to meet individual educational and career goals. This is particularly important in constructing the appropriate policy concentrations. Transfer students are urged to contact their faculty adviser as soon as possible. An appointment may be made directly to talk either with an adviser or with the advising coordinator, Peter Zorn.

INDIVIDUAL CURRICULUM

A student who has educational and professional objectives that cannot be met satisfactorily within the framework of existing majors in the College of Human Ecology may petition to develop an individual curriculum. To be approved, the curriculum must be within the focus of the college and be interdisciplinary in design, include at least 40 credits in human ecology courses, and not exceed the normal number of credits allowed in the endowed divisions. A student develops an individual curriculum in consultation with faculty advisers from at least two subject-matter fields and the program coordinator.

Such a program of study should encompass a substantial part of the student's undergraduate education and must include at least three

semesters. For this reason, a request to follow an individual curriculum should be made as early as possible and must be made before the second semester of the junior year.

If an individual curriculum seems advisable, Patti Papapietro, the individual curriculum coordinator in the Office of Student Services, N101 MVR, will provide direction in formally developing a program of study. Although the individual curriculum coordinator must sign the course enrollment schedule during course enrollment each term, it is a student's responsibility to follow the curriculum as planned or to have any necessary revision approved in writing by his or her advisers and the program coordinator in advance of the program change.

SPECIAL OPPORTUNITIES

Several special programs allow students to receive academic credit for fieldwork and internship experience, to study in absentia, or to enter particular graduate programs after the junior year.

Teacher Certification in Home Economics

Students can combine any major in the college with additional course work that leads to a certificate of qualification for teaching home economics (kindergarten through twelfth grade) in New York State and a number of other states. Interested students should contact the Office of Student Services, in N101 Martha Van Rensselaer Hall.

Human Ecology Field and International Study

Field Study

Field study enables students to learn from participation in community and organizational settings and from structured reflection on that experience through discussion, reading, and writing. This process of integrating conceptualizing issues with practice distinguishes field study and provides the rationale for granting academic credit.

The Human Ecology Field and International Study Office, 159 Martha Van Rensselaer Hall, offers college-wide, prefield preparation and field-based courses with an interdisciplinary problem-solving approach to social issues. Field placements are located in the Ithaca area, New York City, Albany, Washington, D.C., Boston, and elsewhere. Courses are open to registration by all Cornell students.

International Study

Study abroad provides students with an opportunity to add an international dimension to their human ecology program through course work focusing on international problems and intercultural understanding and through sponsored programs of study abroad for which credit is available. Course work in a foreign institution will, in general, be planned to increase knowledge of the people and institutions of the country concerned; fieldwork may provide guided experience in family, community, or agency situations of the country concerned and in an area related to individual student interest in human ecology.

Opportunities for study abroad are available for human ecology students in several ways: through Cornell Abroad, through U.S. college-sponsored programs abroad, and through direct enrollment in a foreign university. In each case, students will remain registered at Cornell during the overseas study, and their study abroad will be credited as part of their Cornell degree program. Applications for study abroad should be submitted to the study-abroad adviser in the Field and International Study Office.

University Programs

Africana Studies and Research Center

Courses taken in the Africana Studies and Research Center (ASRC) may be used to meet some of the distribution requirements of the college. Up to two courses or 8 credits of such courses may be applied toward the 12 additional credits in natural and social sciences (section I-C of the graduation requirements) or toward the 9 additional credits in communication, analysis, and the humanities (section II-B). This allowance is in addition to the freshman writing seminar credits that may be taken in ASRC. Other courses taken in the center count as endowed division electives.

A list of ASRC courses approved to meet distribution requirements or as electives is available in the Office of Student Services.

Double-Registration Programs

Johnson Graduate School of Management

A limited number of highly qualified students from Cornell undergraduate divisions, including human ecology, may be accepted by the Johnson Graduate School of Management after the junior year. Students need the approval of the admissions office and the registrar in the College of Human Ecology. Accepted students should be aware that if the management course work taken in the senior year is in excess of the 21 additional credits allowed in the Cornell endowed divisions, they will be charged for the additional credits on a per-credit basis. Students entering this program must also complete requirements for the degree and major in Human Ecology.

Law School

A small number of highly qualified applicants may be admitted to the Cornell Law School after only three years of undergraduate education. The requirements for admission under these circumstances are more stringent than for acceptance after four years of undergraduate study. Applicants must present outstanding qualifications and strong professional motivation. The junior-year applicant follows the ordinary application procedures for Cornell Law School admission. Interested students should contact the Law School director of admissions to discuss the extraordinary admissions criteria. Since students accepted to this program will be spending their senior year in the Cornell Law School, they need to plan ahead to ensure that distribution requirements for the B.S. degree from the College of Human Ecology will be met. Successful applicants need the approval of the college registrar.

Cornell Medical College

A limited number of highly qualified students from three Cornell divisions, including the College of Human Ecology, may be accepted by the Cornell Medical College after the junior year. To be considered for this program, the student must have completed 105 credits toward graduation by the end of the junior year. Students also need to plan ahead to ensure that distribution requirements for the bachelor of science degree will be met. Accepted students receive 15 credits toward the B.S. degree from their first year of study at the College of Medicine. Interested students should contact the Health Careers Program office in 203 Barnes Hall.

Off-Campus Programs

New York State Assembly Internships

A limited number of session internships with the New York State Assembly are available in spring semester to students of sophomore status and above who are enrolled in New York State colleges or universities. Human ecology students apply to the program through the student's major department. The New York State Assembly also sponsors a summer internship. Further information about internship programs may be obtained through the Field and International Study Office, 170 Martha Van Rensselaer Hall.

Ithaca College

Full-time undergraduate students at Cornell may petition to enroll in courses at Ithaca College. Students pay regular tuition to Cornell and only special fees to Ithaca College, if any are charged. Students are allowed to register for one course a term and may take no more than 12 credits in four years. Exceptions will be granted to Cornell students enrolled in methods and practice-teaching courses at Ithaca College.

Cornell students are eligible to register only in Ithaca College courses that are relevant to their program and that do not duplicate Cornell courses. Acceptance of Cornell students into Ithaca College courses is on a space-available basis. Participation in this program is not guaranteed, and Ithaca College has the right to accept or reject students for any reason it deems appropriate. The program is available only during the fall and spring semesters.

For further information students should contact the college registrar, N101 Martha Van Rensselaer Hall.

Wells College

Full-time undergraduate students at Cornell may petition to enroll in courses at Wells College. Students pay regular tuition to Cornell and only special fees to Wells College, if any are charged. Students are allowed to register for one course a term and may take no more than 12 credits in four years. Exceptions will be granted to Cornell students enrolled in methods and practice-teaching courses at Wells College.

Cornell students are eligible to register only in Wells College courses that are relevant to their program and that do not duplicate Cornell courses. Acceptance of Cornell students into Wells College courses is on a space-available basis. Participation in this program is not guaranteed, and Wells College has the right to accept or reject students for any reason it deems appropriate. The program is available only during the fall and spring semesters.

For further information students should contact the college registrar, N101 Martha Van Rensselaer Hall.

PLANNING A PROGRAM OF STUDY

Academic Advising

When students decide to major in a particular department, they are assigned to a faculty adviser by the advising coordinator in that department. The advising coordinator can help match the student's needs with the special interests of a faculty member. Students are free to change advisers as their own interests change and should see the advising coordinator to discuss such a change. Faculty advisers and counselors in the Office of Student Services, N101 Martha Van Rensselaer Hall, are available to discuss course requirements and sequences, and electives inside or outside the college, as well as future goals and career opportunities. Although advisers must sign the course enrollment schedule card during course enrollment each term, it is the student's responsibility to keep track of his or her courses and to make sure that the program meets graduation requirements for the major and the college. Advising coordinators in each department are happy to answer questions about the advising system and the undergraduate major. Students who are exploring alternative majors should work closely with college counselors who are available for planning and referral to department resource faculty.

Completing Graduation Requirements

A summary of record is kept for each student in the Office of Student Services, N101 Martha Van Rensselaer Hall. At fall registration each continuing student receives a copy showing which major and graduation requirements have already been met. It is important to check this summary and to bring any questions to the attention of staff members in the Office of Student Services. Although a student may complete the requirements of more than one major, he or she is officially certified to graduate under only one.

Electives

Students have individual objectives in choosing courses beyond the minimum requirements of the major. The university is diverse; the departments, centers, and special programs numerous; the fields of study almost unlimited. Counselors and department advisers are available to discuss which courses may interest students and round out their educations.

Students should consult the index of this Announcement for information on where different subjects are taught in the university. Some subjects are taught in more than one division of the university.

Foreign Language Study and Placement

Students who studied a foreign language before coming to Cornell and who want to continue must take either the College Entrance Examination Board (CEEB) achievement test in that language or a departmental language placement test. The latter is given during orientation week in September and again in December, January, and May. Students in human ecology who plan to work with non-English-speaking people in this country or abroad often find it necessary to be proficient in another language. Students who wish to study abroad may find that many study-abroad programs in non-English-speaking countries require the equivalent of two years of college-level language study. For more detailed information, see the section "Advanced Placement of Freshmen."

GRADUATION REQUIREMENTS FOR THE DEGREE OF BACHELOR OF SCIENCE

General

Students applying as undergraduates who do not have the required academic unit in biology, chemistry, or physics are required to show evidence of having met this deficiency before matriculation in the college.

Freshmen and sophomores are required to enroll in at least one human ecology course per semester.

To graduate, students need to

1) meet college credit and distribution requirements,
2) complete requirements for a major,
3) achieve a cumulative average of 1.7 (C–) or better,
4) fulfill residency requirements, and
5) complete two terms of physical education within the first two semesters.

College Requirements

These are the general areas of study and specific courses and credits required of every student in the college. The major you choose may require specific courses listed below or may leave you free to choose among certain courses listed there.

I. Natural and Social Sciences (24 credits)

A. *Natural sciences* (6 credits) selected from Biological Sciences 101–103,102–104, 105–106, 109–110; Chemistry 103–104, 207–208, 215–216; and Physics 101–102,112, 201 or 202, 207–208. Biological sciences courses must be taken sequentially.

B. *Social sciences* (6 credits) selected from economics (including CEH 110,111 but excluding Agricultural Economics 221 and 310); psychology (including Education 110, 311, 317; DEA 150; HDFS 115, 216, 217, 218, 219); sociology (including rural sociology, CEH 148, and HDFS 150). *Do not take both* Economics 101 *and* CEH 110; Economics 102 *and* CEH 111; Psychology 275 *and* HDFS 360; Rural Sociology 101 *and* Sociology 101; *or* Sociology 243 *and* HDFS 150; they are equivalent courses.

C. *Additional credits* (12 credits) selected from any subjects listed above or from courses in anthropology (except archaeology); Astronomy 101 or 102; biochemistry; microbiology; genetics and development; Geological Sciences 101; and government.

II. Communication, Analysis, and the Humanities (15 credits)

A. *Freshman writing seminars* (6 credits) selected from courses listed in the freshman writing seminar brochure.

B. *Additional credits* (9 credits) selected from art; communication; comparative literature; computer science; drawing; English; ancient or modern foreign languages; history; history of art; history of architecture; mathematics; music; Natural Resources 407; philosophy; statistics (students *should not take both* Industrial and Labor Relations 210 *and* Agricultural Economics 310, since the courses are substantially the same); theatre arts; DEA 101,111, or 115; HSS 292; TXA 117, 125, 375; and selected ASRC courses (list available in the Office of Student Services, N101 Martha Van Rensselaer Hall).

III. Human Ecology (40 credits)

A. *Requirements for the major* (the number of credits required varies by major and option).

B. *Fifteen credits to include course work in at least two departments outside the major* with two courses totaling 6 credits minimum in one department and one 3-credit course in a second department. Not more than 3 credits of the15 may be in special studies 400, 401, 402, either departmental or FIS (Field and International Study). HE 100 cannot be used to fulfill this requirement, nor can an undergraduate teaching assistantship designated "403."

An alternative to fulfilling this requirement may be made available for various majors/options by departments establishing a problem-focused set of courses. These will be noted under each major/option when they are developed.

Transfer students (external and internal) can meet this requirement by completion of 15 credit hours comprised of transfer credit and credit earned in the college; or by credit hours all taken in the college and prorated according to the student's status at matriculation.

IV. Additional Credits (41 credits)

A. *Requirements for the major* (number of credits varies from 0 to 15 credits).

B. *Electives* (number of credits varies from 26 to 41 credits).

Credit requirements in this section are met through courses in the *state divisions of Cornell:*

- College of Human Ecology (in addition to courses in sections I, II, and III)
- College of Agriculture and Life Sciences
- School of Industrial and Labor Relations
- College of Veterinary Medicine

and through courses in the *endowed divisions of Cornell:*

- Africana Studies and Research Center
- College of Architecture, Art, and Planning
- College of Arts and Sciences
- College of Engineering
- School of Hotel Administration
- Johnson Graduate School of Management

Courses in the endowed divisions in this section may not exceed a total of 21 credits.

V. Physical Education (2 credits)

Students who have successfully fulfilled these requirements should have completed at least two terms of physical education in their freshman year.

Related Policies

College course requirement. Freshmen and sophomores are required to enroll in at least one course in the College of Human Ecology each semester. Students who fail to comply with this requirement will be reviewed by the Committee on Academic Status for appropriate action.

Section II. Students who score 4 or 5 on the Princeton AP Exam are awarded 3 credits in English. Students who score 5 on the Princeton Exam are exempt from one freshman writing seminar in addition to the 3 English credits awarded.

In sections I, II, and III, the required credits listed are the minimums; credits taken in excess of those minimums (section I, 24 credits; section II, 15 credits and section III, 40 credits) count toward electives (section IV, 41 credits).

In sections I and II, courses specified by the major to meet the requirements in the sections may either be used as meeting the credit requirements in those sections or be applied toward the additional credits in section IV.

Section IV. *There is no limit to the number of credits that may be taken in the state divisions of Cornell,* and therefore students may choose to take additional state credits and graduate with more than 120 credits.

Credits in the endowed divisions in this section may not exceed 21. Any course taken in an endowed division for which a grade of F or U is received will be counted *as part of* the 21 endowed credits allowed.

Elective credits earned in Cornell's endowed divisions during summer session, in absentia credits, and transfer credits are counted as credits earned in the state divisions and therefore do not count as part of the 21 credits allowed in the endowed divisions in meeting the requirements of this section.

Not more than 21 credits in section IV may be taken in the endowed divisions of the university except under *both* of the following conditions:

1) The students must have senior status (must be in the final two semesters prior to graduation);
2) Payment must be made for each credit taken in excess of the 21 allowed, *whether or not the courses are passed.* For the precise fee per credit, students should call the Office of the Bursar.

Related Policies for Transfer Students

Section I-A. Transfers who are entering human ecology programs in consumer economics and housing, design and environmental analysis, human service studies (with the exception of the social work program), and policy analysis can satisfy the College of Human Ecology's natural science graduation requirements with any course(s) taken to meet a former college's natural science requirements as long as the course(s) transferred dealt with matter, energy, and their interrelationships and transformations. Courses in areas such as psychology and mathematics are not included, even though courses in these areas may have been taken to meet a former institution's natural science requirement.

Section II-A. Transfer students should have taken at least 6 credits in courses in English composition or in courses requiring substantial writing and offering instruction in writing equivalent to that offered in the freshmen writing seminar program at Cornell. Students who have not fulfilled this requirement before transferring must fulfill it after matriculation.

Section III-B. External transfer students can meet the requirement for course work outside the major in the College of Human Ecology by completion of either of the following:

1) 15 credits of work, outside their department, comprised of transfer credit and credit earned in the college,

or

2) credits all taken in this college (no transfer credit is allowed to meet this requirement), on the basis of the status of the student's matriculation and prorated as follows:

Status at Matriculation	*Cornell Human Ecology Credits to Satisfy Work outside the Major*
Freshman (1-25 transfer credits)	15
Sophomore (26-55 transfer credits)	12
Junior (56-85 transfer credits)	9
Senior (86-120 transfer credits)	9

In both options, the courses must be in at least two departments outside the major with two courses comprising 6 credits in one department and at least one 3-credit course in a second department. Transfer students from other Cornell divisions are required to take the full 15 credits outside the major.

Note that transfer students are still responsible for completing a total of 40 human ecology credits under section III.

Section IV. Transferred credits for courses applied toward electives do not reduce the 21 Cornell endowed credits that students are allowed. Courses with a passing grade below C– will not transfer to meet human ecology degree requirements.

Section V. Transfer students who have had the equivalent of two semesters of college (and therefore enter as sophomores) are not required to take physical education at Cornell, regardless of whether they took physical education at their first college. Exemption or postponement for medical reasons must be cleared by Gannett Health Center. For further information about exemption from, or postponement of, physical education, students should consult the college registrar, Mary Rhodes, in N101 Martha Van Rensselaer Hall.

Related Policies for Freshmen

Section V. Freshmen are required to take two semesters of physical education during their freshman year. Freshman transfer students entering with 12 or more credits have their physical education requirement reduced to one term.

Residency Requirements

All college curricula are planned to fit within an eight-semester program. An average schedule of 15 credits a semester (in addition to physical education) is considered standard, and if pursued for eight semesters will provide the credits needed for graduation. If the student completes all the requirements—for the major, for distribution, for total credits, and for cumulative average—in fewer than eight semesters, the degree may be conferred at the end of the semester in which the last requirements are met. Students who plan to receive their degrees early should notify the college registrar at the beginning of the semester so that their names can be placed on the list of degree candidates.

Sometimes a student (particularly a transfer student) may need an additional semester to complete a program. To register for a semester beyond the eighth, the student submits a petition to the college registrar. The petition should detail the reasons for wanting to enroll for the extra semester and include a list of courses planned for the additional semester. Such requests are usually granted when there appears to be no feasible way for the student to complete the professional curriculum or the degree requirements without the extra semester.

Freshmen entering the college with 15 transfer credits have seven semesters in which to complete the degree. Transfer students must complete at least 60 credits at Cornell.

Mature students (those at least twenty-four years old at the time of matriculation) are not required to petition the college registrar for approval to study beyond the usual eight semesters.

Exemptions from Requirements

Students who want an exemption from a specific graduation or major requirement may petition, and approval may be given under certain circumstances. Full information about the petition process is given in the Human Ecology Student Guide. Petition forms are available in the Office of Student Services, N101 Martha Van Rensselaer Hall.

PROCEDURES

Course Enrollment

Course enrollment occurs in two steps. During enrollment students request courses, and at university registration students complete information forms, receive their schedules, and have their university IDs validated.

Students are expected to complete course enrollment during specified times each semester. It is the student's responsibility to find out the dates of course enrollment.

Freshmen and transfer students enrolling for the first time in the university in the fall term enroll in their courses during the summer before they arrive on campus.

Continuing students enroll for fall semester in March or April, and enroll for spring semester in October or November preceding the beginning of the term.

Since new students starting at midyear do not have an opportunity to enroll in courses until after they arrive on campus, the college tries to reserve places for them in human ecology courses. The orientation schedule given to all new students lists a specified time for enrolling in such courses. For the first three weeks of the term, new students have an opportunity to add courses in other divisions of the university as well as in human ecology.

Enrollment

Course enrollment materials are mailed to each new student. Continuing students are notified of course enrollment dates by poster and by notices in the *Cornell Daily Sun*. Course enrollment materials are available for continuing students in the Office of Student Services, N101 Martha Van Rensselaer Hall.

Before or during course enrollment, students discuss their program plans with a department adviser or a college counselor in the Office of Student Services. For their advising sessions, students need the list of last-minute changes issued by the college registrar, and the *Course and Time Roster* issued by the university registrar. Students must have their course enrollment schedule signed by their departmental major faculty adviser, or if they have not declared a major, by a college counselor.

Students file completed enrollment materials by the announced deadline in the Office of Student Services, N101 Martha Van Rensselaer Hall.

The following policies and procedures apply to course enrollment.

Permission of Instructor

Certain courses may be taken only with the permission of the instructor as indicated in *Cornell University: Courses of Study*. For such courses, students must obtain the instructor's permission before filing their course enrollment form during the pre-enrollment period. Instructors indicate their permission to take the course by signing the student's course enrollment form.

Students interested in taking a course in the Department of Art in the College of Architecture, Art, and Planning are required to register with the departmental secretary before enrolling in the course. Seniors who want to take an elective course in the Johnson Graduate School of Management are required to obtain permission of the instructor on a course authorization form that the student then files with that school's registrar in 312 Malott Hall.

Special Studies Courses

Each department in the College of Human Ecology (CEH, DEA, HDFS, HSS, DNS, and TXA as well as the Field and International Study Program) offers special studies courses that provide opportunities for students to do independent work not available in regular courses. One of those courses, designated 300, Special Studies for Undergraduates, is intended primarily for students who have transferred from another institution and need to make up certain course work.

The other special studies courses are 400, Directed Readings; 401, Empirical Research; and 402, Supervised Fieldwork. Those courses are normally taken by upperclass students, and work is supervised on an individual basis by a faculty member in the department in which the course is offered. It is important for students to use the appropriate course number (300,400,401, or 402) for a special project.

A student who wants to take special studies courses talks with the faculty member under whose supervision the study would be done and then prepares a plan of work. If the faculty member agrees to supervise the study, the student completes a multicopy special studies form, a multicopy description of the study to be pursued. The student obtains the signatures of the instructor and the department chair as well as the student's department adviser before submitting it to the Office of Student Services. The student also must complete a course registration form in the Office of Student Services. Special studies forms and instructions are available in the Office of Student Services, N101 Martha Van Rensselaer Hall.

To register in a special studies course taught in a department outside the college, students should follow the procedures established for that department.

Course Loads

The normal course load in the college ranges from 12 to 18 credits. *During the course enrollment period no student may enroll for more than 15 credits or five courses, whichever is greater, without special permission from the college registrar.* To receive pennission, a student attaches a note to the course schedule, citing reason(s) for carrying a heavier load, before submitting it to the Office of Student Services, N101 Martha Van Rensselaer Hall.

Credits beyond 15 may be added during the first three weeks of the semester without special permission.

Students should avoid planning excessive work loads; the time required to keep abreast of courses tends to increase as the semester progresses. *Courses cannot be dropped after the seventh week of classes without petitioning,* so students should try to avoid the need to drop courses.

Except for those with mature student status, students must carry at least 12 credits (exclusive of physical education). In special cases, a student may petition to carry between 8 and 12 credits. Forms for petitioning and advice on how to proceed are available from the Office of Student Services, N101 MVR.

Except for mature students, it is seldom possible to have tuition prorated if a student carries fewer than 12 credits during a semester. (See the college registrar for more information.)

Students of mature status may carry 6 to 12 credits without petitioning and may have their tuition prorated. However, at the beginning of each term, mature students planning to take a light course load should pick up a proration of tuition form from the Office of Student Services, fill it out, have it signed by the college registrar, and return it to the bursar's office in Day Hall.

Oversubscribed Courses

Enrollment in many human ecology courses is limited. When a course is over enrolled, students are generally assigned on the basis of seniority or by criteria defined for each course as listed in *Cornell University: Courses of Study*. Student's professional goals may be considered. Those students not admitted to a course may be placed on a waiting list.

Late Course Enrollment

Students who do not file a course enrollment form during the course enrollment period usually must wait until the beginning of the semester to enroll. Extensions are rarely granted and usually only for documented illness.

Students who do not meet the deadline for any reason should see the college registrar in N101 MVR as soon as possible. The college registrar can explain available options on course enrollment procedures under such circumstances.

University Registration

University registration for human ecology students occurs in the auditorium of MVR Hall during the week preceding the start of classes. The Office of the University Registrar announces the specific times of registration.

At registration, students first have their ID validated and pick up a college registration card at the university table immediately inside the door of MVR auditorium.

Next, students fill out the college registration card and proceed to the college table where they submit their college registration card; in return, they receive a computer printout of courses for which they are officially enrolled.

Important: Students are responsible for checking their course schedule for accuracy of course numbers, credit hours, and other data. If there are errors, students must correct them immediately. Procedures for correcting enrollment errors as well as making changes for other reasons are described below under **Course Enrollment Changes.**

Students also receive a *Course and Room Roster* which indicates the locations of their classes.

During university registration in the fall semester, each continuing student receives a copy of his or her **summary of record** from the Office of Student Services. This summary shows graduation and major requirements that the student has completed. Students are responsible for assuring that their academic program meets graduation requirements. Resolve any questions about graduation requirements with the appropriate staff person in the Office of Student Services. Students may direct questions about their academic programs to their faculty adviser or to a counselor in the Office of Student Services.

Late University Registration

A student clearing his or her financial obligations **after** the deadline date on the bursar's bill is considered late. **Late registrants are assessed a finance charge on the bursar's bill starting from the date the bill is due.**

All students must be registered according to university policy before the end of the third week of classes. If for any reason a student registers after that time, there will be a $200 additional charge.

After completing late university registration, the student submits the college registration card to the Office of Student Services and receives a computer printout of the courses for which he or she is officially registered.

Students who fail to register by the third week of the term will be withdrawn from the university. Should withdrawn students wish to return, they must reapply through the admissions committee.

Course Enrollment Changes

Deadlines

- During the first three weeks of the term, courses may be added or dropped.
- From the fourth through the seventh week of the term, course changes may be made with the permission of the instructor.
- After the third week of the term, instructors have the right to consider students' requests for course changes on an individual basis or to announce at the beginning of the term a specific date between the fourth and seventh weeks beyond which they will no longer approve course changes.
- After the seventh week of the term, no course change may be made without petitioning for approval. Petitions are usually granted only in circumstances beyond a student's control (for example, illness). A student petitioning for medical reasons should provide substantiating medical evidence with the petition.
- A student who submits a petition after the seventh week of the term requesting permission to drop a course must attach a statement from his or her faculty adviser to that petition indicating whether or not the advisor supports the request.
- After the eighth week of the term, any student granted permission to drop a course after petitioning will automatically receive a grade of **W** (Withdrawn), and the course will remain on the official transcript.

Deadlines for Half-Term Courses

Students may drop half-term courses within the first three-and-one-half weeks of the course. Students may add classes after the first week of classes only with the permission of the instructor. After the first three-and-one-half weeks, students must petition to drop the course. (See **Petition Process, General Petition Form** for information on the procedure.)

Procedures

It is to the student's advantage to make any necessary course enrollment changes as early in the term as possible. Adding new courses early makes it easier for the student to keep up with course work. Dropping an unneeded course early makes room in the course for other students who may need it for their academic programs.

Ideally, students evaluate their course work load carefully at the beginning of the term. If, in the first week or two, the instructors do not discuss the amount of material to be covered and the extent of student assignments, students need to ask about course requirements.

Some procedures required for course enrollment are also required for course enrollment changes. For example, the instructor's permission must be obtained for a course requiring it, and the same forms for special studies courses must be completed. Aside from the procedures listed below for course enrollment changes, all course change forms for **nutritional science majors** must be signed by the faculty department adviser.

Waiting List: The Office of Student Services maintains waiting lists for students who want to enroll in courses that have been filled. Waiting lists are maintained on a first-come, first-served basis without regard to seniority or other factors. To keep their names active on a waiting list, students must **check in person every 48 hours** with the Office of Student Services; names of students who do not check in are automatically dropped from the list.

Limited enrollment classes: Students who do not attend the first two class sessions of courses with limited enrollment are automatically dropped from the course list. Students can avoid being dropped from a class by notifying the instructor that unavoidable circumstances have prevented their attendance.

There is no charge for course changes completed during the first three weeks of the term. To make course changes during the **first three weeks**, a student takes the following five steps:

1) Obtains a course-change form from the Office of Student Services, N101 MVR.
2) Completes the form and takes it to the appropriate office for signature: for human ecology courses, the forms should be taken to the Office of Student Services; for courses outside the college, the forms should be taken to the appropriate departmental office in the other college.
3) Makes sure that his or her name is added to the list of enrolled students for a course being added, or removed from the class list for a course being dropped. Asks the person recording the change to sign the form.
4) **Submits all signed forms to the Office of Student Services, including the forms for out-of-college courses.** Changes are not completed until the signed forms are filed in that office. If a student does not drop a course that he or she no longer attends, the student is in danger of receiving an **F** in the course.
5) Receives carbon copies of each course change form at the time it is submitted. It is **important** for students to keep these copies to verify later that the forms were filed.

To make course changes during the **fourth through seventh** weeks of the term, a student takes the following steps:

1) Completes the five steps listed above for changes made during the first three weeks.
2) Obtains the instructors' signatures on the course change form for human ecology courses.

To make course changes **after the seventh week** of the term, a student must file a general petition form. (See the section below, **Petition Process**.) Students are expected to attend classes and to do assigned work until the petition has been formally approved or denied.

In absentia Study

Under certain conditions, credit toward a Cornell degree may be given for in absentia study, that is, study done at an accredited institution away from Cornell after the student matriculates in the College of Human Ecology.

To be eligible for in absentia study, a student must be in good academic standing and must receive permission in advance from the college registrar. Students not in good standing may study in absentia but will not receive transcript credit until they have been returned to good standing by the Committee on Academic Status. In some cases, students may petition for in absentia credit after the work has been completed, but there is no guarantee that such credit will be awarded without advance approval.

In absentia petition forms are available in the Office of Student Services, N101 MVR. The student completes the form, has it signed by his or her faculty adviser, attaches catalog descriptions for the courses that will be taken, then submits the form to the Office of Student Services, N101 MVR.

Students receive notice of the petition decision by means of a letter from the college registrar. If the petition is granted, students also receive a form with the letter which must be completed and returned with the fee of $15 to the Office of Student Services to complete in absentia registration. If the in absentia study is undertaken during the summer, the $15 fee is charged only if the summer study is for more than 8 credit hours.

A student may take up to 15 credits in absentia as long as the courses do not duplicate courses already taken and the in absentia courses are applicable to the requirements of the college. A student's petition for more than 15 credits in absentia may be allowed under the following conditions: (1) the work taken represents a special educational opportunity not available at Cornell, (2) it relates to the student's particular professional goals, and (3) those goals are consistent with the focus of the college. The in absentia petition form is used to request more than 15 credits in absentia.

The college registrar requests approval from the appropriate department if a student wants to apply in absentia credit to requirements for his or her major. If in absentia credit is sought for a modern foreign language in which the student has done work, approval by the Department of Modern Languages and Linguistics (College of Arts and Sciences) must be obtained. The department will recommend the number of credits the student should receive and may require the student to take a placement test after returning to Cornell.

The student is responsible for having the registrar of the institution where in absentia study is taken send transcripts of grades to the

Office of Student Services in the College of Human Ecology. Only then will credit be officially assessed and applied to the Cornell degree. Credit for in absentia study will be granted **only** for those courses with grades of C- or better. Only credits (not course names and grades) for in absentia study appear on the Cornell University transcript.

A student who holds a Regents' or Children of Deceased or Disabled Veterans Scholarship may claim that scholarship for study in absentia if the study is done in a college in New York State and if it is for a maximum of 15 credits acceptable to the College of Human Ecology.

The rules regarding study in absentia apply to transfer students with the additional stipulation that at least 60 credits must be taken at Cornell. At least 40 of the 60 credits must be in the College of Human Ecology at Cornell unless the student has transferred equivalent human ecology credit. (No more than 20 credits of equivalent credit may be applied to the 40 credits required in human ecology course work.)

Leaves of Absence

A student may request a leave of absence before the beginning of the semester or during the first seven weeks of the semester for which a leave is sought. A leave may be extended for a second semester by requesting an extension in writing from the Office of Student Services.

A student considering a leave of absence is urged to discuss plans with a counselor in the Office of Student Services. The counselor can supply the necessary forms for the student to complete and file with the Office of Student Services, N101 MVR.

Requests for a leave of absence received after the first seven weeks of the semester, or requests for a leave of absence from students who have already had two semesters' leave of absence, will be referred for action to the Committee on Academic Status. The committee may grant or deny such requests, attaching conditions as it deems necessary. Leaves of absence after the first seven weeks are generally granted only when there are compelling reasons why a student is unable to complete the semester, such as extended illness.

A student who requests a leave of absence after the first seven weeks is advised to attend classes until action is taken on the petition. A student whose petition for a leave of absence is denied may choose to withdraw or to complete the semester.

The academic records of all students who are granted a leave of absence are subject to review, and the Committee on Academic Status may request grades and other information from faculty members to determine whether the student should return under warning or severe warning or in good academic standing.

Withdrawal

A withdrawal is a termination of student status at the university. Students may voluntarily withdraw at any time by notifying a counselor in the Office of Student Services and filing a written notice of withdrawal in the Office of Student Services. A student considering such an action is urged to discuss plans with a counselor in the Office of Student Services, N101 MVR.

In some instances a student may be given a withdrawal by the college registrar. A student who leaves the college without an approved leave of absence or does not return after the leave has expired will be given a withdrawal after the seventh week of the term in which he or she fails to register.

A student who has withdrawn from the college or who has been given a withdrawal by the college registrar and who wishes to return at a later date must reapply through the Committee on Admissions for consideration along with all other applicants for admission. If the student was in academic difficulty at the time of the withdrawal, the request for readmission will be referred to the Committee on Academic Status for consideration, and that committee may stipulate criteria under which the student may be readmitted to the college.

Petition Process

The petition process permits students to request exceptions to existing regulations. Petitions are considered individually, weighing the unique situation of the petitioning student with the intent of college and university regulations.

Students can avoid the necessity to petition by carefully observing the deadlines that affect their academic program. See the **Course Enrollment Changes** section above for some of the important deadlines. If unsure about a deadline, check with a counselor in the Office of Student Services, N101 MVR.

Although many kinds of requests can be petitioned in the college, options other than petitioning may be preferable in some cases. To explore whether a petition is appropriate, the student may discuss the situation with a college counselor or the college registrar in the Office of Student Services.

Students may appeal petitions denied by the college registrar to the Committee on Academic Status. Students who appeal a denied petition **must** attach a statement from the student's faculty adviser before CAS will consider the appeal.

Two kinds of petition forms are available. The uses for both forms are described in the *Human Ecology Student Guide*.

General Petition Form

The general petition form is available in the Office of Student Services, N101 MVR. After completing the form, submit it to the Office of Student Services. Students learn the result of the petition process for the general petition form by checking their mail folder in the student mail center, 138 MVR.

In absentia Petition Form

The in absentia petition form is available in the Office of Student Services, N101 MVR. After completing the form, submit it to the Office of Student Services. In absentia petitions must have attached to them the catalog descriptions of the courses for which credit is requested from the other institution. In absentia petition decisions are sent to students via the U.S. postal service.

GRADES

See the "Grading Guidelines" section for information on the official university grading policies.

S-U Grades

Some courses in the college and in other academic units at Cornell are offered on an S-U basis; that fact is indicated in the *Cornell University: Courses of Study*. University regulations concerning the S-U system require that a grade of S be given for work equivalent to a C– or better; for work below that level, a U must be given. No grade point assignment is given to S, and S or U grades are not included in the computation of semester or cumulative averages. A course in which a student receives an S is, however, counted for credit. No credit is received for a U. Both the S and U grades appear on a student's record. A student who is attempting to qualify for the Dean's List must take at least 12 credits for the usual A–F grades.

Only juniors and seniors may take an S-U grade in courses in which the grade of S or U is optional; however, sophomores may take courses in which *only* the grade of S or U is offered. A student may take no more than four courses (or 12 credits) on an S-U basis during his or her college career; however, more than one S-U course may be taken in one semester. S-U courses may be taken only as electives or in the 15 credits required in the college outside the major unless the requirements for a specific major indicate otherwise. Freshmen enrolled in English 137 and 138 (offered for S-U grades only) are permitted to apply those courses to the freshman writing seminar requirement.

To take a course for an S-U grade, a student must check the course description to make sure that the course is offered on the S-U basis; then either sign up for S-U credit on the course enrollment form, or file an add/drop/change form in the Office of Student Services before the end of the third week of the term. After the third week of the term, students must petition the college registrar to change grade options. Forms are available in the Office of Student Services.

Grades of Incomplete

A grade of incomplete is given when a student does not complete the work for a course on time but when, in the instructor's judgment, there was a valid reason. A student with such a reason should discuss the matter with the instructor and request a grade of incomplete.

Beginning fall 1984, a grade of incomplete may remain on a student's official transcript for a maximum of two semesters and one summer after the grade is given, or until the awarding of a degree, whichever is the shorter period of time. The instructor has the option of setting a shorter time limit for completing the course work.

If the work is completed within the designated time period, the grade of incomplete will be changed to a regular grade on the student's official transcript. If the work is not completed within the designated time period, the grade of incomplete will be automatically converted to an F.

When a student wants to receive a grade of incomplete, the student should arrange a conference with the instructor (preferably before classes end and the study period begins) to work out the agreement. A form, called *explanation for reporting a final grade of* **F** *or incomplete,* which has been signed by both the instructor and the student, must be submitted by the instructor to the Office of Student Services. This form is submitted with the final grade sheets whenever a grade of incomplete is given.

This form is for the student's protection, particularly in the event that a faculty member with whom a course is being completed leaves campus without leaving a record of the work completed in the course.

If circumstances prevent a student from being present to consult the instructor, the instructor may, if requested by the student, initiate the process by filling out and signing part of the form and turning it in to the Office of Student Services with the grade sheet. Before a student will be allowed to register for succeeding semesters, he or she must go to the Office of Student Services to fill out and sign the remainder of the form.

If the work is satisfactorily completed within the required time, the course appears on the student's official transcript with an asterisk and the final grade received for the semester in which the student was registered for the course.

A student who completes the work in the required time and expects to receive a grade must take the responsibility for checking with the Office of Student Services (about two weeks after the work has been handed in) to make sure that the grade has been received. Any questions should be discussed with the course instructor.

NOTE: Grades received more than three weeks after the end of a term are NOT computed in the student's term average when computing the Dean's list. Therefore, students who feel a missing grade or a grade change will make them eligible for the Dean's list must have that grade reported to the Office of Student Services no later than the end of the third week after the term has ended. For purposes of this rule, the last day of final exams is the last day of the term.

ACADEMIC HONORS

The college encourages high academic achievement and recognizes outstanding students in several ways.

Dean's List. Excellence in academic achievement is recognized each semester by placing on the Dean's List the names of students who have completed satisfactorily at least 12 credits with letter grades other than S or U and who have a semester grade point average of 3.5 or above. No student who has received an F or U in an academic course will be eligible.

Kappa Omicron Nu seeks to promote graduate study and research and to stimulate scholarship and leadership toward the well-being of individuals and families. As a chapter of a national honor society in the New York State College of Human Ecology, it stimulates and encourages scholarly inquiry and action on significant problems of living—at home, in the community, and throughout the world.

Students are eligible for membership if they have attained junior status and have a cumulative average of not less than B. Transfer students are eligible after completing one year in this institution with a B average.

Current members of Kappa Omicron Nu elect new members. Not more than 10 percent of the junior class may be elected to membership and not more than 20 percent of the senior class may be elected. Graduate students nominated by faculty members may be elected.

Bachelor of Science with Honors recognizes outstanding scholastic achievement in an academic field. Programs leading to a degree with honors are offered to selected students by the Department of Human Development and Family Studies and the Division of Nutritional Sciences. Information about admission to the programs and their requirements may be obtained from the appropriate department or division.

Bachelor of Science with Distinction recognizes outstanding scholastic achievement. Consideration will be given to seniors whose academic standing at the end of seven semesters is in the top 10 percent of the graduating class. The honor is conferred on those seniors who are in the top 5 percent of the class after grade point averages have been adjusted by including grades for transfer work and after grades earned in the fifth, sixth, and seventh terms have been given double weighting in the final average. The graduating class includes students who will complete requirements for Bachelor of Science degrees in January, May, or August of the same calendar year.

To be eligible for consideration, transfer students must have completed 45 credits at Cornell. In determining the academic standing of a transfer student, previous work taken at another institution is included in the computation of the student's academic average. Names of seniors who meet these requirements are presented to the faculty of the college for approval.

The primary objectives of the honor society, **Phi Kappa Phi**, are to promote the pursuit of excellence in higher education and to recognize outstanding achievement by students, faculty, and others through election to membership. Phi Kappa Phi is unique in that it recognizes scholarship in all academic disciplines.

To be eligible for membership students must rank in the top ten percent of the senior class, or in the top five percent of the junior class. Provisions also exist for the election of faculty members and graduate students whose work merits recognition.

INTERDEPARTMENTAL COURSES

Field and International Study Program

S. Beck, director; R. Bounous, D. Giles, F. McCarthy, L. Shaw

Field Study

Field study enables students to learn from participation in community and organizational settings and from critical reflection on that experience through discussion, reading, and writing. The process of integrating concepts with practice distinguishes experiential education. Students earn credit by participating in internships, community-based research, and lecture tours.

The Field and International Study Program (159 Martha Van Rensselaer Hall) offers courses in pre-field preparation and field-based courses with an interdisciplinary problem-solving approach to social issues and internship experiences. Field study programs are located in the Ithaca area, New York City, and Washington, D.C., with other opportunities possible through arrangements with Field and International Study Program faculty. Courses are open to registration by all Cornell students.

International Study

Study abroad provides students an opportunity to add an international dimension to their human ecology program through credit-earning course work and intercultural understanding in sponsored programs. Learning and participating in a foreign institution will increase a student's knowledge of the people and institutions of the country concerned; fieldwork will provide guided experience in family, community, or agency situations of the country concerned and in an area related to individual student interest in human ecology.

Opportunities for study abroad are available for human ecology students in several ways: through Cornell Abroad or through other U.S. college-sponsored programs abroad. Information and applications for study abroad are available in the Field and International Study Program office (MVR 159).

FIS 100 Skills for Learning in the Field
Fall and spring. 2–3 credits. Prerequisite: permission of instructor. Open to all levels, undergraduate and graduate.
First 7 weeks of semester; T R 2:30–4:25 and variable hours thereafter. Fall and spring. R. Bounous.
Students learn how to become self-directed learners and gain understanding of how to integrate theory and experience. Topics include experiential learning, participant observation, investigative interviewing, understanding nonverbal communication, empowerment, and critical analysis. All of the concepts are applied through fieldwork assignments in an adult literacy program.

FIS 200 Preparation for Fieldwork: Perspectives in Human Ecology
Fall or spring. 4 credits. Limited to 25 students per section. Prerequisite: permission of instructor. Required of all students planning to do FIS 400-level field study or research.
T R 10:10–12:05 or 2:30–4:25. D. Giles.
Introduces students to skills essential for field study, internships, community research, and other experiential learning courses. This course focuses on understanding the multiple cultural and social settings that students will encounter in the small group, organizational, and community contexts of their field study. Through a cycle of active learning, reflection, and reading, students gain experience in analysis of assumptions and biases, participant observation and interviewing skills, effective communication, and group dynamics. By structuring and reflecting upon their own learning, students are prepared for self-

directed, experience-based learning that is the core of field and international study. Course readings provide a conceptual framework for experiential learning and field study methods. Working in small task groups, students apply and synthesize these skills and concepts in community-based projects. Previous semesters' projects included "Collegetown Redevelopment," "Recycling Behavior in Student Neighborhoods," and "Neighborhood Housing Needs in Ithaca."

FIS 210 Preparation for International and Cross-Cultural Experience
Fall or spring. 3 credits. Not open to freshmen. Prerequisite: permission of instructor; preference given to students planning to study abroad or participate in international internships.

T R 12:20–2:15. F. McCarthy.

The course has two main objectives. One is to prepare students for international and cross-cultural experience through the application of observation and interviewing skills, analysis of social and cultural factors in selected countries, and consideration of key issues such as poverty, inequality, industrialization, and race, class, and gender exploitation; the second is to link international processes such as trade and resource flows with national policies and the effects of these processes and policies on the life chances and experience of people. Class activities include discussion, lectures, field experiences, skill development, and a small-group presentation. Students will develop interviewing and observation skills through projects that will focus on the countries in which they intend to study or intern. Strongly recommended for students planning to study abroad, to do international internships, or to take FIS 410. FIS 210 may be substituted for FIS 200 with permission of instructor.

FIS 401 Empirical Research
For study that predominantly involves data collection and analysis.

FIS 402 Supervised Fieldwork
Fall, spring, or summer. 3–15 credits. Limited to 20 students. Prerequisite: FIS 200. Enrollment by permission of instructor. Applications due in the Field and International Study Office during the preceding semester's course enrollment period.

Hours to be arranged. Faculty.

Supervised field study involves both responsible participation in a community setting and reflection on that experience through discussion, reading, and writing. Academic credit is awarded for this integration of concepts with practice. Credit is variable to allow for combined departmental and interdepartmental sponsorship and supervision.

Information on placement opportunities is available in the Field Study Office, 159 Martha Van Rensselaer Hall. Students should begin planning at least a semester in advance for field study.

FIS 403 Teaching Apprenticeship
For study that includes assisting faculty with instruction.

[FIS 406 Sponsored Field Learning or Internships
Fall or spring. 6–15 credits. Limited to 15 students; intended for juniors and seniors. Prerequisite: FIS 200. Enrollment by permission of instructor. Applications are due in the Field and International Study Office during the preceding semester's course enrollment period. Not offered 1992–93.

Hours to be arranged. S. Beck.

A course for students seeking interdepartmental sponsorship and supervision of participation in structured, off-campus field experiences or internships operated by non-Cornell or non-credit-granting institutions or agencies. Completion of course requirements is signified by a formal presentation to the college community upon return to Cornell (graduating seniors may make special arrangements). Credit is variable to allow students to arrange for combined interdepartmental and departmental sponsorship and supervision.

Information on course enrollment and internship opportunities is available in the Field Study Office, 159 Martha Van Rensselaer Hall. Students should begin planning more than one full semester before leaving campus for an internship.]

FIS 407 Field Experience in Community Problem Solving
Fall and spring. 6–15 credits. Limited to 25 students.

FIS 407 Section 01 Issue: Literacy
Prerequisites: FIS 100, FIS 200, or FIS 210; and permission of instructor.

Sem, T R 12:20–2:15; hours in the field to be arranged. R. Bounous.

A course designed to provide students with a structured, closely supervised field experience encompassing an ecological approach to human problem solving. Students spend approximately fifteen hours each week working directly on a literacy project, three hours each week in seminar, and additional time completing seminar readings and assignments. The seminar is aimed at assisting students in systematically analyzing the complex social, cultural, economic, and political factors that affect the life chances of persons with limited literacy skills in our society. Through the field placement, students have opportunities to plan and implement programs and policies that empower people to move beyond systemic barriers.

FIS 407 Section 02 Issue: Poverty and Homelessness in the Upstate Region
Prerequisites: FIS 200 and permission of instructor.

Sem, T R 10:10–11:40; hours in the field to be arranged. L. Shaw.

A course focusing on understanding the problems of poverty and homelessness as well as on service to a local agency that is attempting to respond to them. Students will participate in either service delivery or a research project on behalf of the agency. The aim is to develop skills that will enable students to analyze complex community problems and design solutions that contribute substantive, enduring results to the community.

FIS 408 The Ecology of Urban Organizations: New York City Field Experience
Fall or spring. 9–15 credits. Limited to 25 students; intended for juniors and first-semester seniors. Prerequisites: FIS 200 and permission of instructor. Applications due in the Field and International Study Office during the preceding semester's course enrollment period. Students may enroll in FIS 408 for up to 15 FIS credits. Information on placements is available in 159 Martha Van Rensselaer Hall. Students should begin planning at least one semester before they apply to this course.

S. Beck.

The semester in New York City builds on the learning model developed in the College of Human Ecology in which students learn from their own experiences.

The semester involves four elements: the internship placement, the internship seminar, the multicultural lecture tours and seminar, and additional coursework taught by college faculty or through local institutions.

Students work as interns three to four days each week. Every Friday students meet in seminars where they discuss their internship experiences, multiculturalism, and urban issues. Students also reflect on issues of professional and career development. They also participate in lecture tours or events that expose them to the cultural diversity of life in New York City. The core tours are historical in nature and focus on the question of how New York City became so diverse. Seminar discussions are developed to deepen the meaning of these tours by focusing on the nature of culture, ethnicity, race, class, and gender in New York.

Also on Fridays students participate in a course that focuses on a topic related to multiculturalism taught by College of Human Ecology professors. Other course work at New York City institutions of higher learning is possible.

FIS 200 is a requisite for the course of study.

FIS 409 The Ecology of Organizations in the Upstate Region: Ithaca-Area Field Experience
Fall or spring. 4–15 credits. Limited to 25 students. Prerequisites: FIS 200 and permission of instructor. Applications are due in the Field and International Study Office during the preceding semester's course enrollment period. Weekly seminar meets concurrently with HSS 414.

Sem, T 1:30–4:25; hours in the field to be arranged. L. Shaw.

A variable-credit course designed to give students an in-depth understanding of contemporary organizations and the forces that shape and influence them. The course combines participation in a community setting within commuting distance of the Cornell campus with a weekly seminar. The goal of the course is to provide students the opportunity to work in an organization or agency and at the same time provide self-conscious reflection upon their experiences, using field research or ethnographic methods. Students can arrange for combined interdepartmental and departmental sponsorship and supervision.

Information on placement opportunities is available in the Field and International Study Office, 159 Martha Van Rensselaer Hall. Students should begin planning at least a semester in advance for field study.

FIS 410 Advanced Seminar: Analysis of International Experience
Fall or spring. 3 credits. Prerequisites: experience abroad and permission of instructor.

T R 2:30–4:25. F. McCarthy.

This course provides a context for the integration and interpretation of cross-cultural experience for students returning to the United States after extended periods abroad. The course encourages stduents to relate

personal experience to socioeconomic factors such as gender, race and class, and structuring living situations at home and abroad. Among the issues to be pursued are cultural shock, reentry, patterns and conditions of work, social relationships, friendship, ideology and social explanation, identity and patterns of power and authority. The course features readings, special projects, presentations, and discussions encouraging and facilitating the analysis and understanding of individual cross-cultural experience. The purpose of the course is to maximize student involvement in shaping the analysis and integration of their cross-cultural experience in relation to their personal concerns international processes and academic interests.

CONSUMER ECONOMICS AND HOUSING

W. K. Bryant, chair; J. Gerner, graduate faculty representative; P. Zorn, undergraduate advising coordinator; R. B. Avery, R. J. Avery, W. K. Bryant, P. Chi, F. Firebaugh, J. Gerner, L. Gosse, R. Heck, J. Hogarth, A. Mathios, E. S. Maynes, D. Mont, P. Pollak, M. Rendall, J. Swanson, E. Trzcinski, P. Zorn.

CE&H 110 Introductory Microeconomics
Fall. 3 credits. S-U grades optional. Students who have taken Economics 101 or another introductory microeconomics course should not register for this course.
M W F 9:05; sec. to be arranged. P. Zorn.
Principles of microeconomics with an emphasis on its applicability to consumers. The course acquaints students with the basic economic models of household and firm behavior and their interaction in markets. The goal is to provide students with the ability to analyze the economic implications of consumer decisions and public policies.

CE&H 111 Introductory Macroeconomics
Spring. 3 credits. S-U grades optional. Students who have taken Economics 102 or another introductory macroeconomics course should not register for this course.
M W F 11:15. R. B. Avery.
Principles of macroeconomics with an emphasis on the relevance of economic policies to consumers and households. Topics include national income accounting, aggregate demand and aggregate supply, the role of monetary and fiscal policy in confronting the problems of inflation and unemployment, and international economics.

CE&H 210 Intermediate Microeconomics
Fall or spring. 4 credits. Prerequisite: CEH 110 or equivalent. Course packets on sale in department at approximate cost of $15. Fall: preference to sophomores and juniors. Spring: preference to juniors and seniors.
Fall: Lecs, M W F 10:10 or 11:15; disc, T W R evenings TBA. Two evening prelims. L. Gosse. Spring: M W F 1:25. A. Mathios.
Theory of demand and consumer behavior including classical and indifference curve analyses; theories of production and cost; models for the following markets—competitive, monopoly, monopolistic competition, oligopoly, and inputs; general equilibrium; welfare economics; public goods; risk.

CE&H 226 Household and Family Demography
Spring. 3 credits. Prerequisite: RSOC 101 or equivalent. S-U grades optional.
T R 10:10–11:25. M. Rendall.
This course identifies important trends in U.S. household and family structure, examines the demographic, social, and economic forces behind recent changes in household structure, and evaluates current and future consequences and policy implications of these changes for both households and society. Topics include historical and contemporary trends in the size and composition of families and households, trends in marriage, divorce, remarriage, contraception, childbearing, and living arrangements, and interrelationships between household division of labor. Policy implications of all of the above are also considered.

CE&H 233 Consumers in the Market
Fall. 3 credits. Prerequisites: CEH 110 or equivalent.
M W F 2:30. R. J. Avery.
A study of the structure and functioning of consumer retail markets with emphasis on the role and activities of the major players in these markets—firms, consumers, and governments. The nature and consequences of various types of market failures are studied from the perspective of the firm, the consumer, and the role of government. Case studies and outside lecturers are used to impart reality to the course.

CE&H 247 Housing and Society
Spring. 3 credits. S-U grades optional.
M W F 10:10. Two evening prelims. P. Chi.
A survey of contemporary American housing issues as related to the individual, the family, and the community. The course focuses on the current problems of the individual housing consumer, the resulting implications for housing the American population, and governmental actions to alleviate housing problems.

CE&H 300 Special Studies for Undergraduates
Fall or spring. Credits to be arranged. Hours to be arranged. Staff.
Special arrangement for course work to establish equivalency for courses not transferred from a previous major or institution. Students prepare a multicopy description of the study they want to undertake, on a form available from the Student Services Office. The form, signed by both the instructor directing the study and the head of the department, is filed at course registration or during the change-of-registration period.

CE&H 307 Introduction to Econometrics
Fall. 3 credits. Prerequisites: Ag Econ 310 or equivalent.
T R 8:40–9:55. D. Lillard.
The course introduces students to basic econometric principles and the use of statistical procedures in empirical studies of economic models. Assumptions, properties, and problems encountered in the use of multiple regression procedures are discussed, and simultaneous equation models are introduced. Students are required to specify, estimate, and report the results of an empirical model.

[CE&H 315 Personal Financial Management]

CE&H 320 Economics of Family Policy
Fall. 3 credits. Prerequisite: CEH 210.
M W F 1:25. J. Gerner.
This course examines the economics of family policy, including the behavior that surrounds alimony and child support policy, child welfare policy, marriage arrangements, day care, and maternity leave.

CE&H 325 Economic Organization of the Household
Fall. 3 credits. Prerequisite: CEH 110 or equivalent. S-U grades optional.
M W F 9:05. W. K. Bryant.
Theories and empirical evidence about how households spend their resources are used to investigate the ways they alter the amounts and proportions of time and money spent in various activities, their size, and their form in response to changing economic forces.

CE&H 330 The Economics of Consumer Policy
Fall. 3 credits. Open to juniors, seniors, and graduate students. Prerequisites: CEH 110–111 or permission of instructor. Class packets on sale at Campus Store.
T R 10:10–11:25. D. Lillard.
Students are acquainted with the basic approaches to consumer policy and perform economic analyses of specific consumer policy issues. Three specific areas of policy intervention are addressed: externalities and public goods; anti-trust and regulation of "Natural" monopolies; and markets characterized by imperfect information. Policy discussions are reinforced through the use of specific real-world examples. Students are required to submit a research paper focusing on one specific area of policy intervention discussed in class.

[CE&H 341 The Economics of Consumers' Housing Decisions]

CE&H 348 Housing and Urban Policy
Spring. 3 credits. Prerequisite: CEH 110 or equivalent. S-U grades optional.
M W F 9:05. Staff.
An analysis of government tax, regulatory, and expenditure programs that affect the housing market. Programs and policies at the federal, state, and local levels will be investigated. Detailed consideration will be given to assisted housing programs, community development activities, tax policies, housing finance, fair housing, zoning, and other governmental activities that deal with housing. Local public finance and its relation to housing markets and urban policy will be considered. Economic theory will be used to evaluate these policies.

CE&H 355 Wealth and Income
Fall. 3 credits. Open to sophomores, juniors, and seniors; graduate students may elect to audit and write a research paper for 1 to 2 credits under CEH 600. Prerequisites: CEH 110–111 or equivalent. S-U grades optional.
M W F 9:05. D. Lillard.
The wealth and income positions of American households are defined and described and their economic determinants discussed along with the impacts of tax and expenditure policies and the economics of the political positions for and against such policies.

CE&H 356 The Economics of Welfare Policy
Spring. 3 credits. Prerequisite: CEH 110 or equivalent. S-U grades optional.
M W F 9:05. D. Mont.
Using the tools of economics, this course examines welfare policy. Included are an examination of which populations are affected, what behavior various policies are likely to engender, and how much income redistribution occurs as a result of various welfare policies. Also evaluated are various proposals for welfare reform.

[CE&H 365 Economics of Consumer Law]

CE&H 400–401–402 Special Studies for Undergraduates
Fall and spring. Credits to be arranged. S-U grades optional.
Hours to be arranged. Staff.
For advanced independent study by an individual student or for study on an experimental basis with a group of students in a field of CEH not otherwise provided through course work in the department or elsewhere at the university. Students prepare a multicopy description of the study they want to undertake, on a form available from the Counseling Office. This form must be signed by the instructor directing the study and the department chair and filed at course registration or within the change-of-registration period after registration. To ensure review before the close of the course registration or change-of-registration period, early submission of the special studies form to the department chair is necessary. Students, in consultation with their faculty supervisor, should register for one of the following subdivisions of independent study.

CE&H 400 Directed Readings
For study that predominantly involves library research and independent reading.

CE&H 401 Empirical Research
For study that predominantly involves data collection and analysis.

CE&H 402 Supervised Fieldwork
For study that involves both responsible participation in a community setting and reflection on that experience through discussion, reading, and writing. Academic credit is awarded for this integration of theory and practice.

[CE&H 411 Time as a Human Resource]

[CE&H 432 Financial and Human Capital Investments]

[CE&H 433 Consumerism and the Consumer Affairs Professional]

CE&H 434 Financial and Credit Markets and Policy
Spring. 3 credits. Prerequisite: CEH 111. S-U grades optional.
T R 8:40–9:55. R. B. Avery.
This course will look at the structure of financial markets in the United States. A number of different markets and institutions will be examined including: banks, savings and loans, insurance companies, pension funds, government bond markets, credit unions, and finance companies. The principles underlying government regulation of these institutions will be explored, as well as management problems and concerns. The emphasis will be on learning the institutional environment, not on personal finance.

CE&H 444 Housing for the Elderly
Spring. 3 credits. Prerequisite: CEH 247 or permission of instructor. S-U grades optional.
M W F 2:30–3:20. P. Chi.
This course focuses on the housing needs of the elderly, their current housing conditions—living arrangements, tenure patterns, housing quality and housing expense burden—and socioeconomic and psychological aspects of the housing environment of the elderly. Attention is also given to government housing programs for the elderly, integrating housing and related social service activities, and options for alternative housing.

CE&H 445 Housing, Neighborhood, and Community
Fall. 3 credits. Prerequisite: CEH 247 or permission of instructor. S-U grades optional. Offered alternate years.
M W F 2:30–3:20. P. Chi.
A study of interrelationships between housing conditions, neighborhood transition, and community development. Both theoretical and empirical perspectives on residential patterns, neighborhood change, and community power will be examined. Special attention is also given to government policies that deal with fair housing, residential segregation, neighborhood revitalization, and community development.

CE&H 485 Evaluation of Public Policies
Fall. 3 credits. Prerequisites: CEH 110 or equivalent and an introductory statistics course. Recommended: CEH 210 or equivalent.
M W F 10:10. Staff.
This course provides an introduction to the techniques used to evaluate public policies and programs. It will begin with a review of basic concepts in evaluative research: causal inference, validity, and experimental and quasi-experimental designs. The remainder of the course will concentrate on the tools of cost benefit analysis as a device for evaluating the effectiveness of government programs. Discussions of the techniques, issues, and problems of cost benefit analysis will be highlighted by examples of its use in a variety of public policy areas. Economic analysis and statistical techniques will be emphasized.

CE&H 600 Special Problems for Graduate Students
Fall and spring. S-U grades optional.
Hours to be arranged. Staff.
Independent advanced work by graduate students recommended by their chair and approved by the head of the department and the instructor.

CE&H 601 Research Workshop in Consumer Economics and Housing
Fall and spring. 1–3 credits. S-U grades only.
W 12:20. Staff.
Research seminar designed to provide a forum for graduate students in consumer economics and housing to present their own thesis research at an early stage and to provide critical input for other graduate students.

CE&H 602 Family Resource Management Concepts
Fall. 3 credits. Prerequisite: graduate standing. Class notes for sale in department at approximate cost of $75.
T R 2:30–3:45. R. J. Avery.
Introduction at the graduate level to theories and empirical research on family resource allocation behavior. Particular attention is paid to problems associated with the modeling and measurement of theoretical concepts.

CE&H 603 Economics of Consumer Demand
Fall. 3 credits. Prerequisite: CEH 210, or Economics 311 or 313 or concurrent enrollment in one of the three. S-U grades optional.
M W F 10:10. J. Gerner.
Introduction at the graduate level to theory and empirical research on household demand, consumption, and savings.

CE&H 604 Economics of Household Behavior
Spring. 3 credits. Prerequisite: CEH 210 or Economics 311 or 313 or concurrent enrollment in one of the three. S-U grades optional.
M W F 1:25. D. Mont.
Examination of theoretical and empirical literature concerning market work, human capital formation, household production, and family formation.

CE&H 605 Information and Regulation
Spring. 3 credits. Prerequisite: CEH 603. Class packets on sale at Campus Store.
M W F 2:30. A. Mathios.
A survey of the problems and policies accompanying informational failures and other market failures with regard to consumer well-being. Governmental regulation of products, of producers, of consumers, and of prices is examined. Antitrust activity, disclosure requirements, advertising restrictions, and regulatory agencies are examined in terms of their ability to serve the public interest or to serve special interests. Economic analysis, rather than institutional structure, is emphasized.

CE&H 606 Demographic Techniques
Fall. 3 credits. S-U grades optional.
T R 12:20–1:35. M. Rendall.
This course provides an introduction to the methods, measures, and data used in the analysis of human populations. Topics include demographic rates, standardization and decomposition of differences in rates, life-table analysis, cohort analysis, sources and quality of demographic data, population estimation and projection, and stable population models. Special data sources and methodological issues pertaining to population dynamics and to changes in families and households are also considered.

CE&H 607 Econometric Topics
Spring. 3 credits. S-U grades only. Prerequisite: Ag Econ 710 or equivalent. Offered alternate years.
M W F 2:30–3:20. R. B. Avery.
An advanced econometric course consisting of two separate modules. The first module will cover household survey methodology including sample design, questionnaire development, data weighing, and imputation. The second module will focus on limited dependent variable models. Linear probability, logistic probit, and tobit models will be examined as well as problems of sample section bias.

CE&H 608 Housing Economics
Fall. 3 credits. Prerequisite: CEH 210 or Economics 311 or 313.
M W F 2:30–3:20. P. Zorn.
Introduction at the graduate level to economic theory and empirical research in the housing market. The course will generally take a micro perspective, focusing on housing demand (households' housing mobility,

tenure, and consumption decisions), housing supply (maintenance, home improvement, and new construction), and housing finance (mortgage markets, mortgage choice, mortgage termination). Attention will be paid to the operation of the housing market as well as to relevant public policy issues (governmental tax policy, rent control, discrimination).

CE&H 702 Household Resource Allocation
Spring. 2 credits. Prerequisite: CEH 602 or permission of instructor. S-U grades optional. Offered alternate years.
TBA. Staff.
Family resource allocation is studied in the context of decision processes, and the behavior of decision makers. The relationship of decision making to family management is also explored.

CE&H 703 Consumption and Demand Analysis
Spring. 2 credits. Prerequisite: intermediate microeconomics, CEH 603, and CEH 604; or permission of instructor. S-U grades optional. Offered alternate years.
TBA. Staff.
Major developments in the theory of household behavior with applications to consumption, saving, demand, and expenditure behavior of households. Complete demand systems are surveyed along with theoretically justified specifications of price, income, and demographic variables. The empirical implications of household production for demand are examined. If time permits empirical implications for demand of bargaining models of the household are discussed.

CE&H 704 Family Economics
Fall. 2 credits. Prerequisite: CEH 604 or permission of instructor. S-U grades optional. Offered alternate years.
TBA. Staff.
This course examines the public sector policies that influence family time-allocation decisions. Particular attention will be given to the time allocated by female family members to non-household activities and how these activities are influenced by outside economic forces and by internal family characteristics.

CE&H 705 Consumer Policy
Fall. 2 credits. Prerequisite: intermediate microeconomics. S-U grades optional. Offered alternate years.
TBA. Staff.
An examination of consumer policy in the United States. An interdisciplinary approach will be used in which the theoretical rationale for consumer protection laws, the political processes that mold the shape of current consumer policy, and the administrative, legal, and organizational constraints under which consumer policies operate are explored. In addition, techniques for the economic evaluation of government programs and regulations will be taught and applied to current consumer-protection policies.

CE&H 706 Fundamentals of Housing
Fall. 2 credits. Prerequisite: graduate standing or permission of instructor. S-U grades optional. Offered alternate years.
TBA. Staff.
A survey of housing as a field of graduate study. Consideration of the spatial context and institutional setting of housing, the structure and performance of the housing market, housing finance, the house-building industry, the nature and impact of government housing programs, and the social and economic effects of housing regulations.

CE&H 707 Advanced Demography
Spring. 2 credits. Prerequisite: CEH 606 or equivalent. S-U grades optional. Offered alternate years.
TBA. Staff.
This course examines the size and composition of households and families in the United States, variations in family and household structure among major subgroups, and changes in family and household structure over time and over the life cycle. The demographic processes underlying changes in families and households are examined separately, including marriage, fertility, mortality, and divorce. The determinants of changes in these underlying processes and in family and household structure are analyzed, along with the consequences of these changes for housing demand and consumption, women's labor force participation, household divisions of labor, living arrangements, and economic well-being and poverty.

CE&H 708 Family Finance
Fall. 2 credits. Prerequisites: an introductory statistics course, CEH 315 or equivalent, and CEH 602. S-U grades optional. Offered alternate years.
TBA. Staff.
This course examines the financial dimension of the household with emphasis on asset and debt formation. Resource use is examined, emphasizing financial resources such as income, expenditures, savings, credit, and investments. A critical examination of current theories in the area of management and a survey of literature in the fields are included.

CE&H 709 Income Distribution Analysis
Spring. 2 credits. Prerequisites: CEH 603 and CEH 604. S-U grades optional. Offered alternate years.
TBA. Staff.
This course examines the economics of income distribution, focusing on measurement, and policy issues.

CE&H 899 Master's Thesis and Research
Fall and spring. Prerequisite: permission of the chair of graduate committee and instructor. S-U grades optional.
Graduate faculty.

CE&H 999 Doctoral Thesis and Research
Fall and spring. Prerequisite: permission of the chair of graduate committee and instructor. S-U grades optional.
Graduate faculty.

DESIGN AND ENVIRONMENTAL ANALYSIS COURSES

W. R. Sims, chair; F. D. Becker, graduate faculty representative; M. Boyd, undergraduate advising coordinator; A. Basinger, R. Beckman, A. Bushnell, S. Danko, P. Eshelman, A. Hedge, J. Jennings, J. Laquatra

Note: A minimal charge for photocopied course handouts may be required.

DEA 101 Design I: Fundamentals
Fall. 3 credits. Each section limited to 18 students. Permission of instructor required. Priority given to interior design majors. Option I majors must take DEA 101 in fall. Approximate cost of materials, $60.
Fall: M W 1:25–4:25, or T R 10:10–1:10.
M. Boyd.
A studio course introducing the fundamental vocabulary and principles of two-dimensional design. Students experiment with the development of form through problem-solving approaches.

DEA 102 Design II: Fundamentals
Spring. 3 credits. Permission of instructor required. Option I DEA majors only. B– or higher in DEA 101 required to register for this course. Option I majors must take DEA 102 and 115 concurrently. Approximate cost of materials, $200; shop fee, $10.
T R 1:25–4:25. A. Bushnell.
A studio course in three-dimensional design with an interior design emphasis. Problems in spatial organization are explored through drawings and models.

DEA 111 Introduction to Design
Spring. 3 credits.
M W F 12:20–1:10. R. Beckman.
Introduction to the field of design for students in any academic area. The course reviews the spectrum of design activities, examining various movements in the visual arts and differences among designers in philosophical premises, social and functional roles, and cultural positions. Also examined are how requirements in the built environment are affected by the interaction of people, design, and materials. Lectures and visual material are presented by DEA faculty members and visiting design professionals.

DEA 114 Drawing
Spring. 3 credits. Limited to 18 students. Priority given to DEA majors. Minimum cost of materials, $50.
M W 1:25–4:25. M. Boyd.
A studio drawing course open to students without previous drawing experience. Focus is on descriptive, design-oriented drawing to improve abilities of visual analysis, develop visual communication skills, and enhance general visual awareness.

DEA 115 Drawing for Interior Design
Spring. 3 credits. Option I DEA majors only. Must take DEA 102 and DEA 115 concurrently. Minimum cost of materials, $100.
T R 10:10–1:10. A. Bushnell.
A studio drawing course for interior designers. Discussion groups on drawing techniques are held to develop a visual understanding and vocabulary. Students are introduced to the functions of line, shape, and value. Perspective, spatial, and conceptual drawing are emphasized.

DEA 150 Introduction to Human-Environment Relations
Fall. 3 credits.
M W F 12:20–1:10. Staff.
Introduction to the influence of physical environment on human behavior. Topics include environmental influences on crowding, community, crime, and friendship; environmental needs associated with characteristics such as stages in life cycle, life styles, social class, family structures, and handicaps; person-environment fit for lighting, acoustics, indoor air quality and ventilation, and thermal comfort; introduction to human factors and systems analysis; effects of environment on perception-cognition; user-responsive design; participatory design programming; and post occupancy evaluation.

DEA 201 Design III: Basic Interior Design
Fall. 5 credits. Each section limited to 18 students. Prerequisites: DEA 101,102, and 115 (minimum grades of B–.) Recommended: DEA 111 and 150. Coregistration in DEA 203 is required. Minimum cost of materials, $150; shop fee, $10; optional field trip, approximately $100; diazo machine fee, $8.

M T R 1:25–4:25, W 1:25–2:30. S. Danko.
Beginning interior design studio. Focus is on development of basic proficiency in interior design skills. The course is structured around a series of elementary interior and interior-product design problems of 3 to 5 weeks in length.

DEA 202 Design IV: Basic Interior Design
Spring. 5 credits. Each section limited to 18 students. Prerequisites: DEA 201 and 203. Prerequisites or corequisites: DEA 111 and 204. Minimum cost of materials, $120; diazo machine fee, $8.

M 1:25–2:15, W 1:25–4:25, T R 9:05–12:05. P. Eshelman.
Second interior design studio. Emphasis of the course is on continued development of basic proficiency in design skills through exposure to a selected set of interior and interior-product design problems of limited complexity. Each problem of 3 to 5 weeks duration is structured to emphasize different aspects of the design process.

DEA 203 Design Communications
Fall. 1 credit. Priority given to DEA majors. Lab fee $10.

W 2:30–4:25. S. Danko.
Communication techniques for architectural and interior designers. Students study the various forms of communication used throughout the design process, from programming and conceptualization through construction documentation, and the most effective utilization of those forms. Both verbal and visual presentation methods are stressed.

DEA 204 Introduction to Building Technology
Spring. 1 credit.

M 2:30–4:25. W. Sims.
Introduction to building technology for interior designers and facility managers. Emphasis is placed on developing basic understanding of buildings and building systems and their implications for interior design and facility management. Covers basic building types; structural systems; construction materials and methods; HVAC systems; plumbing, electrical, lighting, fire, and security systems; and telephone, computer, and other communication systems.

[DEA 210 Responsive Design for the Elderly
Spring. 2 credits. 7-week course. Prerequisite: DEA 150. Not offered 1992–93.

F 12:20–2:15. Staff.
The course deals with the rationale, database, and design requirements for creating responsive designs that address elderly user's needs. The literature on conceptual models, theories, and research approaches used to create data-based design requirements and guidelines are investigated. This information should be understood by anyone who intends to design, plan, or manage physical environments that meet the needs of "old" people.]

DEA 250 The Environment and Social Behavior
Fall. 3 credits. Prerequisite: DEA 150 or permission of instructor.

T R 10:10–12:05. F. Becker.
A combination seminar-and-lecture course for students interested in the social sciences, design, or facility management. Through projects and readings the influence of environmental form on social behaviors such as aggression, cooperation, communication, community, and crime is explored. Also covered are the influences of stage in life cycle, family structure, and social class on environmental needs and purposes. Implications for the planning, design, and management of complex environments such as offices, hospitals, schools, and housing are emphasized.

DEA 251 Historic Design I: Furniture and Interior Design
Spring. 3 credits. Prerequisites: DEA 101 and 111. Recommended sequence: DEA 251, 252, and 353.

M W F 10:10–11. J. Jennings.
A study of the patterns of historical development and change in architecture, furniture, and interiors from people's earliest expressions to mid–eighteenth century as they reflect the changing cultural framework of Western civilization, excluding America.

[DEA 252 Historic Design II: Furniture and Interior Design
Fall. 3 credits. Prerequisite: DEA 101. Corequisite: DEA 111. Recommended sequence: DEA 251, 252, and 353. Not offered 1992–93.

M W F 9:05.
A study of the patterns of historical development and change as revealed through American architecture, furniture, and interiors, 1650–1885. Design forms are considered individually, collectively, and in their historical context as they express the efforts, values, and ideals of American civilization.]

DEA 300 Special Studies for Undergraduates
Fall or spring. Credit to be arranged.

Hours to be arranged. Department faculty.
Special arrangement for course work to establish equivalency for courses not transferred from a previous major or institution. Students prepare a multicopy description of the study they want to undertake on a form available from the Student Services Office. The form, signed by both the instructor directing the study and the head of the department, is filed at course registration or during the change-of-registration period.

DEA 301 Design V: Intermediate Interior Design
Fall. 5 credits. Prerequisites: DEA 111,150, 201, 202, 203, and 204. Corequisite: DEA 303 and 459. Minimum cost of materials, $150; shop fee, $10; optional field trip, approximately $100; diazo machine fee, $8.

M 1:25–2:15, W 1:25–4:25, T R 10:10–1:10. R. Beckman.
Intermediate-level interior design studio. The course is organized around a series of interior and interior-product design problems of intermediate-level complexity, 3 to 5 weeks in duration. Focus is on development of design skills and on understanding of a selected set of generic problem types.

DEA 302 Design VI: Intermediate Interior Design
Spring. 5 credits. Prerequisites: DEA 301 and 303. Corequisite: DEA 304. Minimum cost of materials, $150; shop fee, $10; diazo machine fee, $8.

W 1:25–2:15, M T R 1:25–4:25. J. Jennings.
Second-semester, intermediate-level interior design studio. Continued emphasis on development of design skills and exposure to generic problem types with an emphasis on communication and construction detailing. National design competitions form the basis for studio projects.

DEA 303 Introduction to Furnishings, Materials, and Finishes
Fall. 1 credit.

M 2:30–4:25. Staff.
Basic understanding of furniture types and systems; interior products and equipment such as work-stations; window, wall, and floor coverings; ceiling and lighting systems; and materials and finishes. Emphasis is placed on criteria for selection of furnishings materials and finishes for typical interior design and facility management problems.

DEA 304 Introduction to Professional Practice of Interior Design
Spring. 1 credit.

W 2:30–4:25. A. Basinger.
Introduction to organizational and management principles for delivery of interior design and facility management services. Covers basic organizational structures and basic management functions within interior design and facility management organizations, work flow and scheduling, business practices, legal and ethical responsibilities and concerns, contracts, basic contract documents such as working drawings and specifications, supervision of construction and installation, and cost estimation.

[DEA 325 Human Factors: Ergonomics–Anthropometrics
Spring. 3 credits. Recommended: A 3-credit statistics course and DEA 150. Not offered 1992–93.

M W 10:10–12:05. A. Hedge.
Implications of human physical and physiological characteristics and limitations on the design of settings, products, and tasks. An introduction to engineering anthropometry, biomechanics, control/display design, work physiology, and motor performance. Course includes practical exercises and field project work.]

[DEA 348 Environmental Graphics and Signing
Spring. 3 credits. Recommended: design background. Limited to 20 students. Approximate cost of materials $50. Not offered 1992–93.

M W 10:10–1:10. M. Boyd.
A studio course dealing with both the functional and visual aspects of environmental graphics. Includes projects in interior and exterior graphics, signing, and directional systems.]

DEA 349 Graphic Design
Spring. 3 credits. Enrollment limited to 20 students. Recommended: design background. Priority given to DEA majors. Approximate cost of materials, $50.

M W 10:10–1:10. M. Boyd.
The fundamentals of lettering, typography, layout, and presentation techniques. Printing processes and the application of photography

and illustration are also covered. A series of projects explores problems typical of the graphic design field.

[DEA 350 Human Factors: The Ambient Environment
Fall. 3 credits. Recommended: DEA 150. Not offered 1992–93.
T R 10:10–12:05. A. Hedge.
An introduction to human-factors considerations in lighting, acoustics, noise control, indoor air quality and ventilation, and the thermal environment. The ambient environment is viewed as a support system that should promote human efficiency, productivity, health, and safety. Emphasis is placed on the implications for planning, design, and management of settings and facilities. Course includes a field project.]

[DEA 353 Historic Design III: Contemporary Design
Spring. 3 credits. Recommended sequence: DEA 251, 252, and 353. Not offered 1992–93.
M W F 11:15–12:05.
A historical study of the emergence and development of contemporary design, 1885 to the present. Examines the social, economic, technical, and stylistic forces that shape the design forms of the present and includes a critical analysis of selected examples of architecture, interiors, and furniture.]

[DEA 361 Residential Design
Spring. 3 credits. Approximate cost of materials, $30. Not offered 1992–93.
T R 10:10–12:35.
An introduction to residential architectural design. While designing a solution for specific occupant needs, students consider site, orientation, climate, and materials. Drafting work consists of plans, elevations, perspectives, and presentation of solutions. Lectures, discussions, and required readings.]

DEA 400–401–402–403 Special Studies for Undergraduates
Fall or spring. Credits to be arranged. S-U grades optional.
Hours to be arranged. Department faculty.
For advanced independent study by an individual student or for study on an experimental basis with a group of students in a field of DEA not otherwise provided through course work in the department or elsewhere at the university. Students prepare a multicopy description of the study they want to undertake on a form available from the Counseling Office. This form must be signed by the instructor directing the study and the department head and filed at course registration or within the change-of-registration period after registration. To ensure review before the close of the course registration or change-of-registration period, early submission of the special studies form to the department head is necessary. Students, in consultation with their advisers and the instructor should register for one of the following subdivisions of independent study.

DEA 400 Directed Readings
For study that predominantly involves library research and independent reading.

DEA 401 Empirical Research
For study that predominantly involves data collection and analysis, or laboratory or studio projects.

DEA 402 Supervised Fieldwork
For study that involves both responsible participation in a community setting and reflection on that experience through discussion, reading, and writing. Academic credit is awarded for this integration of theory and practice.

DEA 403 Teaching Apprenticeship
For study that includes teaching methods in the field and assisting faculty with instruction. Students must have demonstrated a high level of performance in the subject to be taught and in the overall academic program.

DEA 454 Facility Planning and Management Studio
Spring. 4 credits. Prerequisite: DEA 459 or permission of instructor. Letter grades only. Minimum cost of materials, $100.
T R 1:25–4:25. W. Sims.
For advanced undergraduates interested in facility planning and management. Purpose is to provide basic tools, techniques, and concepts useful in planning, designing, and managing facilities for large, complex organizations. Covers strategic and tactical planning for facilities, space forecasting, space allocation policies, programming, site selection, building assessment, space planning and design, furniture specifications, and moves. Sociopsychological, organizational, financial, architectural, and legal factors are considered.

DEA 455 Research Methods in Human–Environment Relations
Spring. 3 credits. Prerequisites: DEA 150 or permission of instructor, and a statistics course.
M W F 9:05–9:55. Staff.
The course develops the student's understanding and competence in the use of research and analytical tools to study the relationship between the physical environment and human behavior. Emphasis is placed on selection of appropriate methods for specific problems and the policy implications derived from research. Topics include research design, unobtrusive and obtrusive data-collecting tools, the processing of qualitative and quantitative data, and effective communication of empirical research findings.

DEA 459 Programming Methods in Design
Fall. 3 credits.
M W F 9:05–9:55. Staff.
Introduction to environmental programming. Emphasis on formulation of building requirements from user characteristics and limitations. Diverse methods for determining characteristics that will enable a particular environmental setting to support desired behaviors of users and operators. Methods include systems analysis, soft system, behavior circuit, behavior setting, and user characteristic approaches. Selection of appropriate methods to suit problems and creation of new methods or techniques are emphasized.

DEA 499 Design VII: Advanced Interior Design
Fall and spring. 6 credits. Option I majors must take 6 credits of DEA 499. They are strongly encouraged to satisfy the basic 6-hour DEA 499 requirement in the fall semester and to continue with an additional studio in the spring semester. Prerequisites: DEA 301, 302, 303, and 304. DEA 302 and 499 may not be taken concurrently. To balance class registration loads it may be necessary for the department to determine students' scheduling of this course for either fall or spring. Minimum cost of materials, $150; diazo machine fee, $8 per semester.
M T W R 1:25–4:25. A. Bushnell.
A comprehensive design–problem-solving experience involving completion of an advanced interior design problem selected by the student and approved by the instructor. The course consists of five phases of three to four weeks each: programming; schematic design and evaluation; design development, including material and finish selection; design detailing; and in-process documentation and the preparation of a professional quality design presentation.

DEA 600 Special Problems for Graduate Students
Fall or spring. Credit to be arranged. S-U grades optional.
Hours to be arranged. Department faculty.
Independent advanced work by graduate students recommended by their special committee chair and approved by the head of the department and instructor.

DEA 645 Design Process and Methods
Spring. 3 credits. Limited to 15 graduate and advanced undergraduate students. Prerequisite for undergraduates: permission of instructor.
T R 8–9:55. S. Danko.
Focuses on thinking processes and techniques that support creative problem solving. Design methodologies of famous designers such as da Vinci, Ben Franklin, and Charles Eames will be examined through discussions and applications to short studio problems by the students. Topics include a historical overview of the design process and methods in both professional practice and education, creative problem solving in management and design, perceptual blocks to creativity, and the inherent merits and pitfalls in the four realms of thinking: analytical, intuitive, synthetic, and evaluative.

[DEA 648 Computer-Aided Space Planning and Design
Fall. 3 credits. Limited to 12 graduate and advanced undergraduate students. Prerequisites for undergraduates: DEA 201 and 202 or permission of instructor. Not offered 1992–93.
Lec, T R 9:05–9:55; lab 1, T R 10:10–12:05; lab 2, TR 12:20–2:15. P. Eshelman.
Familiarizes students with computer applications in the planning and design of spaces. Lectures and readings cover needs assessment, furniture and equipment inventory, affinity diagramming, block diagramming, space layout, and specification and schedule preparation for furniture, equipment, and finishes. Laboratories involve the application of computer-aided processes in planning and designing a variety of spaces.]

DEA 650 Programming Methods in Design
Fall. 4 credits. Recommended: DEA 325, 350, and 455.
M W F 9:05–9:55 and an hour to be arranged. Staff.
A course intended for graduate students who want a more thorough introduction to environmental programming methods than is provided by DEA 459. Each student is required to attend DEA 459 lectures, meet with the instructor and other graduate students for an additional class each week, and do additional readings and projects.

[DEA 651 Human Factors: Ergonomics-Anthropometrics
Spring. 4 credits. Recommended: DEA 150. Not offered 1992–93.
M W 10:10–12:05 and an hour to be arranged. A. Hedge.
A course intended for graduate students who want a more thorough grounding in human factors than is provided by DEA 325. Each student is required to attend DEA 325 lectures, meet with the instructor and other graduate students for an additional class each week, and do additional readings and projects.]

[DEA 652 Human Factors: The Ambient Environment
Fall. 4 credits. Recommended: A 3-credit statistics course and DEA 150. Not offered 1992–93.
T R 10:10–12:05 and one hour to be arranged. A. Hedge.
A course intended for graduate students who want a more thorough grounding in human factors than is provided by DEA 350. Each student is required to attend DEA 350 lectures, meet with the instructor and other graduate students for an additional class each week, and do additional readings and projects.]

DEA 653 Psychology of Workplace Design
Spring. 3 credits. Prerequisite: DEA 250/660 or permission of instructor.
M 7:30–10:30 p.m. F. Becker.
Intended for students interested in the planning, design, and management of facilities for complex organizations. The purpose of the course is to explore how characteristics of the workplace, including furniture and equipment and policies governing their use and allocation, affect individual and organizational effectiveness. Special topics, such as the human implications of new information technologies and work at home, are also covered.

DEA 654 Facility Planning and Management Studio
Spring. 4 credits. Prerequisite: permission of instructor. Letter grades only. Minimum cost of materials, $200.
T R 1:25–4:25. W. Sims.
For graduate students in facility planning and management. The purpose of the course is to provide basic tools, techniques, and concepts useful in the planning, design, and management of complex facilities. Covers strategic and tactical planning for facilities, space forecasting, space allocation policies, programming, site selection, building assessment, space planning and design, furniture specifications, and moves. Sociopsychological, organizational, financial, architectural, and legal factors are considered.

DEA 656 Research Methods in Human-Environment Relations
Spring. 4 credits. Prerequisites: DEA 150 or permission of instructor, and a statistics course. Letter grades only.
M W F 9:05, and an hour to be arranged. Staff.
The course develops the graduate student's understanding and competence in the use of research and analytical tools to study the relationship between the physical environment and human behavior. Students attend DEA 455 lectures but have more extensive readings and projects and meet an additional hour each week.

DEA 659 Seminar on Facility Planning and Management
Fall. 1 credit. For graduate students and advanced undergraduates interested in careers in facility planning and management. S-U grades only.
M 4:30–5:45. F. Becker, W. Sims.
Series of seminars led by Cornell faculty members and other professionals directly involved in facility planning and management. Topics include strategic space planning, space standards, office automation, project management, energy conservation, building systems, wire management, lighting, and acoustics.

DEA 660 The Environment and Social Behavior
Fall. 4 credits. Prerequisite: DEA 150 or permission of instructor.
T R 10:10–12:05, plus an hour to be arranged. F. Becker.
A combination seminar-and-lecture course for graduate students with interests in social sciences, facility management, or design. Graduate students attend DEA 250 lectures but have more-extensive readings and meet an additional hour each week.

DEA 668 Design Theory Seminar
Fall. 3 credits. Enrollment limited to 15 students.
R 7:30–10:30 p.m. R. Beckman.
Directed toward advanced undergraduate and graduate students with interest in the theory of design. The purpose is to provide an understanding of major theoretical ideas underlying design movements of the twentieth century. Explores these ideas through readings, lectures by faculty and visitors, student presentations of research papers, and seminar discussions.

DEA 899 Master's Thesis and Research
Fall or spring. Credits to be arranged. Prerequisite: permission of the chair of the graduate committee and the instructor. S-U grades optional.
Hours to be arranged. Department graduate faculty.

HUMAN DEVELOPMENT AND FAMILY STUDIES COURSES

S. Hamilton, chair; S. Cornelius, graduate faculty representative; M. Potts, undergraduate advising coordinator; C. Anderson, U. Bronfenbrenner, J. Brumberg, R. Canfield, S. Ceci, M. Cochran, J. Condry, J. Doris, J. Eckenrode, J. Haugaard, C. Hazan, B. Koslowski, L. C. Lee, M. Lenzenweger, B. Lust, P. Moen, K. Pillemer, H. Ricciuti, S. Robertson, J. Ross-Bernstein, R. Savin-Williams, G. Suci, S. West, E. Wethington

[HDFS 111 Observation
Spring. 3 credits. Not offered 1992–93.]

HDFS 115 Human Development
Fall or summer. 3 credits. S-U grades optional.
M W F 11:15. R. Canfield.
Provides a broad overview of theories, research methods, and current knowledge of human development from conception into adulthood. Course material primarily covers infancy and childhood with somewhat less focus on adolescent and adult development. Topics include biological, intellectual, linguistic, social and emotional development as well as the cultural, social, and interpersonal contexts that affect developmental processes and outcomes in these domains.

HDFS 150 Families and the Life Course
Spring or summer. 3 credits. S-U grades optional. Students cannot receive credit for both HDFS 150 and Sociology 243.
M W F 11:15. Staff.
This course provides an introduction to social scientific research on family roles and functions. Families are examined in regard to how they appear in U.S. history, how they change over the life course, and how they are influenced by cultural and economic forces.

[HDFS 216 Human Development: Adolescence and Youth
Spring or summer. 3 credits. Prerequisite: HDFS 115. S–U grades optional. Not offered 1992–93.
TBA. Staff.
Provides a broad overview of theories, issues, and research in the study of human development from early adolescence to early adulthood (youth). Attention is focused on the interplay of biological and cognitive factors, interpersonal relationships, social structure, and cultural values in shaping the individual's development. The role of adolescence in both the individual's life course and the evolution of the culture as a whole is also considered. Familial, peer group, educational, and work contexts for development are discussed.]

[HDFS 218 Human Development: Adulthood and Aging
Fall. 3 credits: Prerequisite: HDFS 115. S-U grades optional. Not offered 1992–93.
TBA. Staff.
Provides a general introduction to theories and research in adult development and aging. Psychological, social, and biological changes from youth through late adulthood are discussed. Both individual development within generations and differences among generations are emphasized.]

HDFS 242 Participation with Groups of Young Children
Fall or spring. 4 credits (3 credits possible, but not recommended). Limited to 20 students (limit depends on availability of placements and of supervision). Prerequisites: HDFS 115 and permission of instructor. S-U grades optional.
W 10:10–12:05, plus 2 half-days of field work (for 4 credits) or 1 half-day of field work (for 3 credits). In morning or afternoon. S. West.
This course is designed to integrate developmental theories with supervised experience in child care centers, with the intention of enhancing the student's abilities to understand and to relate effectively with young children. Participation, observation, reflection, reading, writing, and sharing of viewpoints are some of the means used to these ends. Placements are in local nursery schools, day care centers, Head Start programs, and kindergartens.

HDFS 258 Historical Development of Women as Professionals, 1800 to the Present (also Women's Studies 238 and History 238)
Fall. 3 credits. S-U grades optional. Human ecology students must register for HDFS 258.
T R 10:10–11:40. J. Brumberg.
The historical evolution of the female professions in America (midwifery, nursing, teaching, librarianship, home economics, and social work) as well as women's struggles to

gain access to medicine, law, and the sciences. Lectures, reading, and discussion are geared to identifying the cultural patterns that fostered the conception of gender-specific work, and the particular historical circumstances that created these different work opportunities. The evolution of "professionalism" and the consequences of professionalism for women, family structures, and American society are also discussed.

HDFS 259 Socialization, Social Control, and Deviance across the Life Course
Spring. 3 credits. Prerequisites: HDFS 150 or Sociology 101 or Rural Sociology 101.
T R 8:30–9:55. E. Wethington.
Provides an overview of sociological theories and research on how normative social values and social relationships regulate individual behavior. Theories and research on social control, crime, delinquency, and creativity are emphasized.

HDFS 300 Special Studies for Undergraduates
Fall or spring. Credit to be arranged.
Hours to be arranged. Department faculty.
Special arrangement for course work to establish equivalency for courses not transferred from a previous major or institution. Students prepare a multicopy description of the study they want to undertake on a form available from the Student Services Office. The form, signed by both the instructor directing the study and the coordinator of undergraduate education, is filed at course registration or during the change-of registration period.

HDFS 313 Problematic Behavior in Adolescence
Spring. 3 credits. Prerequisite: HDFS 115 or Psychology 101; HDFS 216 recommended.
T R 12:20–1:40. J. Haugaard.
This course will explore several problematic behaviors of adolescence, including depression, drug abuse, eating disorders, and delinquency. Various psychological, sociological, and biological explanations for the behaviors will be presented. Appropriate research will be reviewed; treatment and prevention strategies will be explored.

HDFS 331 Learning in Children
Fall. 3 credits. Prerequisite: HDFS 115 or equivalent. Limited to 20 students.
T 10:10–12:05. Field experience to be individually arranged. M. Potts.
Examines diverse theories and models of learning and their differing implications for real-world situations that require learning or relearning. Considers the interrelations of learning and development and of learning and intelligence. Through fieldwork, application is made to the assessment of learning processes in the cognitive domain and to implementation of the variables which affect learning.

HDFS 333 Cognitive Processes in Development
Spring. 3 credits. Prerequisite: HDFS 115 or equivalent.
TBA. G. Suci.
A survey of theories and problems in the development of selected cognitive processes: attention, perception, mediation processes, and language. The focus is on the first two years of life.

[HDFS 334 The Growth of the Mind
Spring. 4 credits. Open to undergraduate and graduate students. Graduate students should also enroll in HDFS 635, a supplemental graduate seminar. Prerequisites: A course in human experimental psychology, statistics, or HDFS 115 or equivalent; or permission of the instructor. S-U grades optional. Not offered 1992–93.
T R 3:10–4:25. B. Lust.
In this course the fundamental issues of cognition are introduced. What is the nature of human intelligence? of logical and scientific reasoning? How are knowledge and understanding acquired and represented in the human mind? What is the nature of mental representation? What are the cognitive characteristics of the mind at birth? What is the relation of the acquisition of knowledge and understanding to their final representation? What are the relations between language and thought? In the study of those issues, how can epistemology and experimental psychology be related through the experimental method?

Basic debates in the study of cognition are introduced and discussed throughout: for example, the roles of innateness and learning, the distinction between competence and performance, and the relation between induction and deduction in the acquisition of knowledge. Those psychological issues are set in a context of basic epistemological issues involving the tension between rationalism and empiricism.

The course will analyze Piaget's comprehensive theory of cognitive development and experimental results. Current research in cognitive development will be introduced and contrasted.]

HDFS 344 Infant Behavior and Development
Fall. 3 credits. Prerequisites: HDFS 115, a biology course, and a statistics course. Not open to freshmen.
T R 1–2:15. S. Robertson.
Behavior and development from conception through the first two years after birth will be examined in traditional areas (e.g., perception, cognition, socioemotional, language, motor). The fundamental interconnectedness of these aspects of development will be strongly emphasized, as well as their relation to the biology of fetal and infant development. Topics with implications for general theories of development will be emphasized (e.g., the functional significance of early behavior, the nature of continuity and change, the role of the environment in development). Conditions which put infants at risk for poor development (e.g., premature birth, exposure to environmental toxins, maternal depression) and topics with current social, ethical, or political implications (e.g., infant day care, fetal rights) will also be considered. An emphasis on research methodology in the study of early behavior and development will be maintained throughout the course.

HDFS 346 The Role and Meaning of Play
Spring. 2 credits. Limited to 30 juniors and seniors. Prerequisite: HDFS 115. Recommended: HDFS 111.
W 7:30–9 p.m. J. Ross-Bernstein.
The aim of this course is to examine the play of children ages three through seven. Through seminar discussions, workshops, films, and individualized research, the student will explore the meanings and validity of play in the lives of young children, the different ways that children play and the value of each, and the effect of the environment in enhancing and supporting play.

HDFS 347 Human Growth and Development: Biological and Behavioral Interactions (also Biology and Society 347 and Nutritional Sciences 347)
Spring. 3 credits. Prerequisites: Biological Sciences 101 or 109 or equivalent, and HDFS 115 or Psychology 101. Offered alternate years. Limited to 100 students.
M W F 1:25. J. Haas, S. Robertson.
This course is concerned with the interrelationships between physical and psychological growth and development in humans, particularly during infancy. Intrinsic and extrinsic causes of variations in growth, including various forms of stimulation, are considered. In addition, the consequences of early growth and its variations for current and subsequent behavioral, psychological, and physical development are examined. The interaction between physical and behavioral or psychological factors is emphasized throughout the course.

HDFS 348 Advanced Participation in Early Childhood
Fall or spring. 3 or 4 credits. Prerequisites: HDFS 115 and HDFS 242 and permission of instructor. Recommended: HDFS 346.
Two or 3 half-days' participation (morning or afternoon) and an hour group conference each week. J. Ross-Bernstein/ S. West.
An advanced, supervised field-based course, designed to help students deepen and consolidate their understanding of children. Students are expected to define their own goals and assess progress with supervising teachers and instructor; to keep a journal; and to plan, carry out, and evaluate weekly activities for children in their placement. Conference group and readings focus on contexts of development and on ways to support children's personal and interpersonal learning.

[HDFS 354 Families in Cross-cultural Perspective
Fall. 3 credits. Prerequisites: HDFS 115 and HDFS 150 or Rural Sociology 100, or equivalent. S-U grades optional. Not offered 1992–93.]

HDFS 359 American Families in Historical Perspective (also Women's Studies 357 and History 359)
Spring. 3 credits. Prerequisite: HDFS 150 or one 200-level social science or history course. S-U grades optional. Human ecology students must register for HDFS 359.
T R 10:10–11:40. J. Brumberg.
This course provides an introduction to and overview of problems and issues in the historical literature on American families and the family life cycle. Reading and lectures demonstrate the pattern of American family experience in the past, focusing on class, ethnicity, sex, and region as important variables. Analysis of the private world of the family deals with changing cultural conceptions of sexuality, sex roles, generational relationships, stages of life, and life events. Students are required to do a major research paper on the history of their family, covering at least two generations, and demonstrating their ability to integrate life-course development theory, data drawn from the social sciences, and historical circumstances.

HDFS 360 Personality Development
Spring. 3 credits. Prerequisites: HDFS 115 or Psychology 101, plus one other course in HDFS or psychology. Students cannot receive credit for both HDFS 360 and Psychology 275. Offered alternate years.
T R 12:20–2. C. Hazan.
This course is designed as an introduction to theory and research in the area of personality development. It will include a detailed review of several major theories of personality and human behavior (e.g., psychoanalytic, learning, phenomenological). In addition, the course will cover some of the major developmental tasks and trends as they relate to personality development, including the development of emotions, gender identity, empathy, impulse control, and perceived competence. The influence of innate and environmental determinants of personality will also be examined.

[HDFS 361 The Development of Social Behavior
Spring. 3 credits. Limited to 100 students. Prerequisite: HDFS 115 or Psychology 128. Offered alternate years. Not offered 1992–93.
M W F 12:20. J. Condry.
Issues in the development of social behavior are viewed from the perspective of theory and research. An attempt is made to apply our understanding of social behavior to education, childrearing, and group behavior. Likely topics include bases of social behavior in early childhood, the role of peers, the development of aggressive behavior, the development and functioning of attitude and value systems, conformity and deviation, and the function and limits of experimental research in the study of social development.]

HDFS 362 Close Relationships across the Lifespan
Fall. 3 credits. Prerequisite: HDFS 115 or equivalent. S-U grades optional.
T R 12:20–2. C. Hazan.
This course analyzes the nature and function of close relationships from infancy through adulthood. Special emphasis is given to the interplay between innate tendencies and social experience, and the effects of social cognitive development. The material presented is drawn from a wide variety of theoretical and empirical literatures. Topics include attachment in human infants, childhood relationships with parents and peers, interpersonal attraction, intimacy and commitment, marriage, divorce, and the role of close relationships in physical and mental health.

HDFS 370 Abnormal Development and Psychopathology
Spring. 3 credits. Limited to sophomores, juniors, and seniors. Prerequisites: HDFS 115, Psychology 101, or Education 110; a course in statistics (e.g., Psych 350, Soc 301, Educ 352 or 353, Ag Ec 310 or equivalent); and an introductory biology course.
M W F 11:15. M. Lenzenweger.
A research-based survey of the cognitive, emotional, and biological aspects of abnormal development across the life span. The major mental illnesses will be covered, including schizophrenia, anxiety disorders, affective disorders, and personality disorders as well as psychopathological disorders of childhood. Emphasis will be placed on the development of psychopathology, current theories and models of etiology, and intervention strategies. This course is intended to be a rigorous introduction to the scientific study of psychopathology and psychopathological development; minimal attention to psychotherapy.

HDFS 397 Experimental Child Psychology
Fall. 4 credits. Prerequisites: one course in statistics and permission of instructor. Intended primarily for students interested in entering graduate programs involving further research training.
M W 10:10–12:05. L. C. Lee.
A study of experimental methodology in research with children. Includes lectures, discussions, and practicum experiences covering general experimental design, statistics, and styles and strategies of working with children.

HDFS 398 Junior Honors Seminar
Fall. 2 credits. Permission of the coordinator of the honors program required for registration. Enrollment limited to students in the honors program.
Hours to be arranged. J. Condry.
Reports and discussion of research and selected thesis topics by faculty and honors students.

HDFS 400–401–402–403 Special Studies for Undergraduates
Fall or spring. Credits to be arranged. Enrollment limited to juniors and seniors with a minimum 3.0 G.P.A. Permission required. Prerequisites: either HDFS 115, 150, and two intermediate level HDFS courses, or four courses in pyschology or sociology. S-U grades optional.
Hours to be arranged. Department faculty.
For advanced independent study by an individual student or for study on an experimental basis with a group of students in a field of HDFS not otherwise provided through course work in the department or elsewhere at the university. Students prepare a multicopy description of the study they want to undertake, on a form available from the Student Services Office. This form must be signed by the instructor directing the study and the student's faculty adviser and submitted to NG14 MVR, the Office of Undergraduate Education. After clearance that all prerequisites are met, the student picks up the form in NG14 to file at course registration or within the change-of-registration period after registration. To ensure review before the close of the periods, early submission of the special studies form to the Office of Undergraduate Education is necessary. Students, in consultation with their supervisor, should register for one of the following subdivisions of independent study (guidelines for each are available in NG14 Martha Van Rensselaer Hall):

HDFS 400 Directed Readings
Prerequisites: In addition to the general prerequisite courses, a statistics or methods course and at least one course directly linked to the area of study.
For study that predominantly involves library research and independent study.

HDFS 401 Empirical Research
Prerequisites: In addition to the general prerequisite courses, a statistics or methods course and at least one course directly linked to the area of study.
For study that predominantly involves data collection and analysis, or laboratory or studio projects.

HDFS 402 Supervised Fieldwork
Prerequisites: In addition to the general prerequisite courses, an observation or participation course.
For study that involves both responsible participation in a community setting and reflection on that experience through discussion, reading, and writing. Academic credit is awarded for this integration of theory and practice.

HDFS 403 Teaching Apprenticeship
Prerequisites: In addition to the general prerequisite courses, must have taken the course or equivalent and received a grade of B+ or higher.
For study that includes assisting faculty with instruction.

HDFS 417 Female Adolescence in Historical Perspective (also Women's Studies 438 and History 458)
Spring. 3 credits. Limited to 20 students. Prerequisites: HDFS 258 or 359 or a 200- or 300-level history or women's studies course. Permission of instructor required.
W 2–4:25. J. Brumberg.
A reading, writing, and discussion course that will attempt to answer a basic historical question that has consequence for both contemporary developmental theory and social policy: How has female adolescence in the United States changed in the past 200 years? The focus will be on the ways in which gender, class, ethnicity, and popular culture shape adolescent experience. Although the required readings are primarily historical in nature, students are encouraged to think about the interaction of biology, psychology, and culture. Students are required to do a primary source research paper.

HDFS 432 Cognitive Development and Education
Spring. 3 credits. Prerequisite: HDFS 115 or equivalent. Limited to 20 students.
T 10:10 12:05; field experience to be individually arranged. M. Potts.
This course defines basic cognitive processes that underlie education (for example, linguistic processes that underlie language comprehension and production; numerical processes that underlie mathematics; perceptual processes that underlie reading) and reviews research on the development and learning of these processes in children. A laboratory component focuses on assessment and facilitation of cognitive competencies as they bear on one educational subject.

HDFS 436 Language Development (also Psychology 436 and Linguistics 436)
Spring. 4 credits. Open to undergraduate and graduate students. Graduate students should also enroll in HDFS/LING 633, a supplemental graduate seminar. Prerequisite: at least one course in developmental psychology, cognitive psychology, cognitive development, or linguistics. S-U grades optional. Offered alternate years.
T R 3:10–4:25. B. Lust.
This course surveys basic issues, methods, and research in the study of first-language acquisition. Major theoretical positions in the field are considered in the light of experimental studies in first-language acquisition of phonology, syntax, and semantics from infancy on. The fundamental issues of relationships between language and thought are discussed, as are the fundamental

linguistic issues of Universal Grammar and the biological foundations for acquisition. The acquisition of communication systems in nonhuman species such as chimpanzees is addressed, but major emphasis is on the child.

HDFS 438 Thinking and Reasoning
Fall. 3 Credits. Prerequisite: HDFS 115 or Psychology 101.

W 2–4:25. B. Koslowski.
The course will examine the areas of logical thinking (in formal as well as real-world contexts), the process of making logical and "natural" inferences, problem solving and transfer, causal reasoning, scientific reasoning, theories of evidence and expert vs. novice reasoning. Two general issues will run through the course: the extent to which children and adults approximate the sorts of reasoning that are described by various types of models, and the extent to which various models accurately describe the kind of thinking that is required by the types of problems and issues that arise and must be dealt with in the real world.

HDFS 440 Internship in Cornell Early Childhood Program
Fall or spring. 10–12 credits. (30–36 hours per week) Prerequisites: HDFS 115 and 242. Recommended: HDFS 346 and 348. Permission of instructor required.

Hours to be arranged. S. West.
Opportunity to integrate theory with practice at an advanced level and to further develop understanding of preschool children and their families. Placement as assistant teacher in one of the preschool groups and participation in curriculum planning, evaluation, staff meetings, home visits, parent conferences, and parent meetings. Supervision by head teacher and instructor. Time commitment includes placement, journal, readings, meetings with supervisors, and special projects.

[HDFS 456 Families and Social Policy
Spring. 3 credits. Prerequisite: one course in the area of the family or in sociology. S-U grades optional. Not offered 1992–93.

Hours to be arranged. P. Moen.
An examination of the intended and unintended family consequences of governmental policies, using case studies in areas such as social welfare, day care, and employment. The policy implications of changes in the structure and composition of families are also considered.]

HDFS 457 Health and Social Behavior
Fall. 3 credits. Prerequisites: HDFS 115 or HDFS 150 or HSS 101 and a course in statistics. Letter grades only.

M W F 10:10. E. Wethington.
This course critically examines theories and empirical research studies which assert that social structure, family processes, social support, and social stress have important effects on physical health, mental health, and health behaviors.

HDFS 461 The Psychology of Television
Spring. 3 credits. Limited to 100 students. Preference given to juniors and seniors. Prerequisite: a developmental or psychology course; HDFS 115 or Psychology 101 preferred.

M W F 12:20. J. Condry.
This course offers a historical and topical survey of the research literature regarding the influence of television. Topics include (1) the introduction of television from 1950 to 1960 and its direct effects, (2) the audience for television, (3) the content of television, (4) behavioral mechanisms of influence: imitation, disinhibition, arousal/desensitization, (5) the psychological research of the 1960s and 1970s; cognitive mechanisms of influence; mainstreaming and resonance; formal features, comprehension, and perceived reality; current issues in research from 1980 on; the role of advertisements; government policies and advertisements; and television over the life span.

[HDFS 462 Curiosity and Intrinsic Motivation
Fall. 3 credits. Limited to 20 students. Open to graduate students and advanced undergraduates with a strong background in developmental psychology. Prerequisites: HDFS 115 or Psychology 101 and HDFS 360 or 361. Letter grades only. Not offered 1992–93.

Hours to be arranged. J. Condry.
This course will cover a variety of issues in the study of Intrinsic Motivation. What is the nature of this motivational structure? How does it develop, and what is the role of the social environment in encouraging or discouraging it? What role does it play—or might it play—in the educational process? The course will be taught in a seminar format with weekly readings and class discussions.]

[HDFS 464 Sexuality Minorities and Human Development
Spring. 3 credits. Not offered 1992–93.

Hours to be announced.

R. Savin-Williams.
The issue of human sexuality is one that is frequently ignored in higher education in the United States today. The first half of the course will cover topics of a fairly general nature regarding theoretical, research, and applied issues on sexual minorities. The course texts will provide a stimulus for various topics to be covered. In the second half of the course, students will determine the content through their selection of particular topics that interest them. The course will be responsive to the educational needs of the students who are enrolled each semester. Its success depends on students feeling personally engaged and committed to the course content. Because of the multidisciplinary nature of the course, it is hoped that students from a variety of backgrounds in disciplines, gender, sexual orientation, ethnicity, race, class, and religious affiliation will feel comfortable in the course.]

[HDFS 472 Typical and Atypical Intellectual Development
Spring. 3 credits. Prerequisites: HDFS 115, a course in statistics, and a course in biology. Not offered 1992–93.

T R 10:10–11:30. S. Ceci.
This course provides an intensive historical examination of both normal and abnormal intelligence, focusing on the antecedents of contemporary views of the heritability of intelligence, brain-behavior linkages, expertise, generality, and cognitive modifiability. It concludes with an examination of current theories, with an emphasis on the instructor's own bioecological theory.]

[HDFS 488 Development in Context (also Psychology 488)
Spring. 4 credits. Open to juniors, seniors, and graduate students. Prerequisites: one course in statistics (which may be taken simultaneously) and two courses in social sciences, or one in human biology and one in social sciences. Letter grades only. Not offered 1992–93.

TBA. Staff.]

HDFS 498 Senior Honors Seminar
Fall and spring. 1 credit. Required for, and limited to, seniors in the HDFS honors program.

Hours to be arranged. J. Condry.
This seminar is devoted to discussion and presentation of honors theses being completed by the senior students.

HDFS 499 Senior Honors Thesis
Fall or spring. Credit to be arranged. Prerequisite: permission of thesis adviser and coordinator of honors program. S-U grades optional.

Department faculty.

Topics Courses

Fall or spring. 2–4 credits. Prerequisites and enrollment limits vary with topic being considered in any particular term. Permission of instructor required.

Hours to be arranged. Department faculty.
This series of courses provides an opportunity for advanced undergraduates to explore an issue, a theme, or research in the areas of departmental concentration. Topics vary each time the course is offered. Descriptions are available at the time of course registration. Although the courses are usually taught as seminars, a subject may occasionally lend itself to lecture, practicum, or other format.

HDFS 415 Topics in Adolescent Development

HDFS 435 Topics in Cognitive Development

HDFS 445 Topics in Early-Childhood Development and Education

HDFS 455 Topics in Family Studies

HDFS 465 Topics in Social and Personality Development

HDFS 475 Topics in Atypical Development

HDFS 485 Topics in the Ecology of Human Development

The Graduate Program

HDFS graduate courses are only open to undergraduates with instructor's permission.

General Courses

HDFS 610 Processes in Human Development
Spring. 3 credits. Limited to 20 students. Open to graduate students and juniors and seniors in HDFS and related fields with recommendation from a faculty member and instructor's permission. Prerequisite: a minimum of one course in statistics. Letter grades only.

M 2:30–4:25. U. Bronfenbrenner.
This course focuses on research that illuminates processes of human development as a function of organism-environment interaction through the life course. Topics to be examined will be drawn from the following: the ecology of cognitive development, developmentally instigative characteristics of persons and environments; developmental processes in males and females; activity and work as developmental processes; intimate relationships as contexts of development;

developmental processes in adulthood. The final selection will be responsive to student interests.

[HDFS 617 Adolescence
Spring. 3 credits. Not offered 1992–93.
Hours to be arranged. Staff.
Critical examination of seminal theoretical and empirical writings on adolescent development. Empirical research on specific questions chosen by students is considered in the light of these approaches.]

HDFS 631 Cognitive Development
Fall. 3 credits. Letter grades only. Offered alternate years.
TBA. Staff.
Faculty members involved in the course will present their area of specialization in cognitive development. These areas will include perception, attention, memory, language, thinking and reasoning, learning, creativity, and intelligence.

HDFS 640 Infancy
Fall. 3 credits.
TBA. S. Robertson.
Development in infancy will be examined through a critical review of key research and theory in selected aspects of neurobehavior, perception, cognition, language, emotion, and social relationships. Theoretical issues to be considered include the role of experience in early development, sensitive periods, continuity and discontinuity in development, and the functional significance of early behavior. Some of the conditions that put infants at risk for poor development will also be considered, such as premature birth, perinatal medical complications, and exposure to environmental toxins. The course will combine perspectives from developmental psychology and psychobiology.

[HDFS 641 Early-Childhood Development and Education
Fall. 3 credits. Not offered 1992–93.
TBA. M. Potts.
Survey of major issues in the theoretical and research literature of early-childhood education.]

HDFS 650 Contemporary Family Theory and Research
Fall. 3 credits.
TBA. E. Wethington.
Sociological and social psychological theories and research in the area of the family are examined with reference to the relationship between the family and society, the processes of socialization and social control, the reproduction of gender and social class, and social group rates of deviance and psychological disorder.

[HDFS 660 Personality and Socialization
Spring. 3 credits. Will be taught in conjunction with HDFS 361. Not offered 1992–93.
Hours to be arranged. J. Condry.
Major issues in personality development and socialization, with special emphasis on theoretical models and empirical issues.]

HDFS 670 Developmental Psychopathology
Spring. 3 credits. Prerequisite: an undergraduate course in abnormal psychology or psychopathology; a course in multivariate statistics; and substantive course work in neurobiology or related biological science.
Hours to be arranged. M. Lenzenweger.
Overview of current theories and empirical research on functional and organically based psychological disorders. Topic areas to be covered include autism, schizophrenia, anxiety disorders, affective disorders, and personality disorders. Focus is on the developmental and etiology of psychopathology.

Topical Seminars

Seminars offered irregularly, with changing topics and instructors. Content, hours, credit, and instructors to be announced. Seminars offer concentrated study of specific theoretical and research issues.

HDFS 618 Seminar in Adolescence
Topics include peer relations, parent-teen relationships, self-esteem, youth and history, work, and moral development.

HDFS 633 Seminar on Language Development
Topics include acquisition of meaning in infancy, precursors of language in early infancy, and atypical language development.

HDFS 635 Seminar in Cognitive Development
Topics include early attention, perception, memory, and communication. Assessment and intervention in relation to these processes will be considered when possible.

HDFS 645 Seminar on Infancy
Topics covered in depth include the role of emotions in early development, infant stimulation and early experience, and the assessment of infant developmental competencies.

HDFS 646 Seminar in Early-Childhood Development and Education
Topics include analysis of models and settings, design of assessment techniques, program evaluation, and early childhood in a cross-cultural context.

HDFS 655 Seminar in Family Studies
Topics include the sociology of marital status, the single-parent family, work-family linkages, women and work, and families and social change.

HDFS 665 Seminar in Personality and Social Development
Focuses on selected issues related to personality and social development. The issues selected vary each year according to current importance in the field and student interests.

HDFS 675 Seminar in Developmental Psychopathology
Topics include learning disabilities, therapeutic interventions in atypical development, child abuse and maltreatment, family factors in the etiology of functional disorders, and cognitive characteristics of atypical groups.

HDFS 685 Seminar in Human Development and Family Studies
Topics include development of self-concept, sex-role identity, observational methods, and interviews in developmental research.

HDFS 690 Seminar on Ecology of Human Development
Topics include the institutional setting as a determinant of behavior, the poor family, and the identification and measurement of ecological variables.

Individualized Special Instruction

HDFS 700–706 Special Studies for Graduate Students
Fall or spring. Credits and hours to be arranged. S-U grades at discretion of instructor.
Department faculty.
Independent advanced work by graduate students recommended by their Special Committee chair with approval of the instructor.

HDFS 700 Directed Readings
For study that predominantly involves library research and independent study.

HDFS 701 Empirical Research
For study that predominantly involves collection and analysis of research data.

HDFS 702 Practicum
For study that predominantly involves field experience in community settings.

HDFS 703 Teaching Assistantship
For students assisting faculty with instruction. Does not apply to work for which students receive financial compensation.

HDFS 704 Research Assistantship
For students assisting faculty with research. Does not apply to work for which students receive financial compensation.

HDFS 705 Extension Assistantship
For students assisting faculty with extension activities. Does not apply to work for which students receive financial compensation.

HDFS 706 Supervised Teaching
For advanced students who assume major responsibility for teaching a course. Supervision by a faculty member is required.

HDFS 899 Master's Thesis and Research
Fall or spring. Credit to be arranged. S-U grades only. Prerequisite: permission of thesis adviser.
Department graduate faculty.

HDFS 999 Doctoral Thesis and Research
Fall or spring. Credit to be arranged. S-U grades only. Prerequisite: permission of thesis adviser.
Department graduate faculty.

HUMAN SERVICE STUDIES COURSES

J. Ford, chair; B. L. Yerka, graduate faculty representative; C. Reed, undergraduate advising coordinator; J. Allen, R. J. Babcock, D. Barr, R. Battistella, R. Bounous, D. Brown, J. Greene, A. Hahn, R. House, J. Kuder, C. McClintock, M. Minot, B. J. Mueller, L. A. Noble, A. Parrot, V. Rennick, C. Shapiro, L. Street, D. Tobias, W. Trochim, J. Ziegler, I. Lazar, Emeritus

HSS 101 Human Services in Contemporary Society
Fall. 3 credits. Recommended for freshmen and first-year transfer students.
T R 10:10–12:05. D. Barr.
A lecture and discussion course designed as an introduction to the community base of services. Current and historical human services are examined. Emphasis is placed on social services, education, health, and criminal justice. Barriers to service delivery are discussed, such as racism, sexism, classism, sexual preference, physical disability, and

age. Contemporary issues that impact on service delivery will also be discussed with attention to the relationship between direct service and public policy.

HSS 203 Groups and Organizations
Spring. 3 credits.
M W F 10:10–11. Staff.
A basic course in the social psychology of small groups and human service organizations. Study of group processes includes self-perception and interpersonal perception of roles, norms, communication, power, and leadership. Students apply what has been learned about small groups to the study of issues in human service organizations (for example, goals, evaluation, structure, technology, relationships between organizations and clients, environment, and change).

HSS 210 The Elements of Helping
Fall and spring. 3 credits. Limited to 20 students. *Not* recommended for social work majors. S-U optional.
M 7:30–10 p.m. R. Babcock.
An introduction to the theoretical and practical aspects of human service processes. Included is an overview of the helping relationship covering roles, characteristics, relationships, dilemmas, and career issues of helpers. The course focuses on understanding and development of helping skills. Through role playing and exercises, students deal with basics such as attending, listening, responding, empathy, respect, genuineness, and confronting. Other topics include self-awareness, learning, communication, and conflict management.

HSS 225 Education as a Human Service
Fall. 3 credits.
M W F 11:15–12:05. M. Minot.
An introductory course concerned with the role of the educator as a professional provider of preventive and remedial intervention through knowledge that results in intentional changes in cognitive, affective, or psychomotor skills of individuals. Educators, in collaboration with other human service professionals, facilitate human growth and development. The course includes an overview of educational programs that use human ecology content in selected human service delivery systems and settings. Emphasis is placed upon the competencies and responsibilities of professionals assuming the educative role.

HSS 246 Determinants of Behavior
Fall. 3 credits. Prerequisites: introductory sociology and introductory psychology and one course in human development.
M W F 2:30–3:20. J. Mueller.
Provides an interdisciplinary knowledge base for human service professionals. Examines social behavior in the human environment from ecological, ethological, historical, cultural, and social system perspectives. Applications are made to professional practice at the micro level (counseling with individuals and families or other small groups) and at the macro level (social planning for vulnerable groups in our society).

HSS 280 Racism in American Society (also ASRC 280)
Fall. 3 credits.
W 7:30–10 p.m. D. Barr, J. Turner.
The purpose of this course is to explore the historical, political, and sociological dimensions of racism in American society. A major goal will be to understand the presence and persistence of racial inequality and the relationship of human services to the problems of racism.

HSS 292 Research Methods
Spring. 3 credits.
W 7:30–10 p.m. C. McClintock.
Students will learn the logic and methods of social science research and develop skill in transforming issues of interest to them into researchable questions. Readings, written assignments, and in-class exercises focus on stating hypotheses, designing studies and samples to test hypotheses, measuring variables, and simple statistical analysis.

HSS 300 Special Studies for Undergraduates
Fall or spring. Credit to be arranged.
Hours to be arranged. Department faculty.
Special arrangement for course work to establish equivalency for training in a previous major or institution. Students prepare a multicopy description of the study they want to undertake on a form available from the Student Services Office. This form, signed by both the instructor directing the study and the head of the department, should be filed at course registration during the change-of-registration period.

HSS 315 Human Sexuality
Spring. 3 credits. Limited to 500 students. Prerequisite: an introductory course in human development and family studies, psychology, or sociology (or equivalent social science course). Recommended: one course in biology.
T R 2:30–3:45; sec to be arranged.
A. Parrot.
The aim of this course is to provide students with an understanding of the interactions and interrelationships of human behavior that influence sexual development and behavior. The course will focus on the evolution of sexual norms, customs, legislation within changing sociopolitical systems, and delivery of services related to sexual issues, needs, and/or problems. Biological developmental components of human sexuality will also be addressed. An underlying issue is the influence of our social and cultural system on the development of sexual needs, standards, and values. Research and theory in human sexuality will be explored in an interdisciplinary approach drawing on human and organizational behavior, biology, history, communication arts, education, research theory, law, sociology, and psychology.

[HSS 325 Health-care Services and the Consumer
Fall. 3 credits. Prerequisite: an introductory course in human services or health. S-U grades optional. Offered alternate years. Not offered 1992–93; next offered 1993–94.
T R 12:20–1:45. A. Parrot.]

[HSS 330 Ecology and Epidemiology of Health
Spring. 3 credits. S-U grades optional. Offered alternate years. Not offered 1992–93; next offered 1993–94.
M W F 11:15–12:05. J. Ford.]

HSS 340 The Politics of Public Budgeting
Spring. 3 credits. Limited to 50 students: juniors, seniors, or permission of instructor.
T R 10:10–12:05. Staff.
The course examines the theory and practice that have developed to plan and control raising and spending public funds. The study of public budgeting includes the examination of techniques for controlling spending and methods for raising revenues. Because these fiscal decisions are made in a political environment, the course will take a multidisciplinary approach, synthesizing both the political and economic aspects of budgeting. Students will assume the roles of the different actors in the budgetary process to learn both the institutional dynamics of the process and the political constraints involved.

HSS 360 Introduction to Program Planning and Development
Fall and spring. 3 credits.
M W F 9:05–9:55. M. Minot.
The course provides an introduction to program planning and development in the delivery of human services. Models of program planning, development, and delivery will be analyzed in relation to practice. The processes of conceptualizing a program and the context of planning and development (political, organizational, economic, and social) will be examined. Basic tools and techniques available to planners will be identified and selected skills developed. Issues related to ethics, power/authority, confidentiality, and accountability will be included. Professional roles and competencies needed will be highlighted throughout the course. Students will apply the planning and development process to individual projects.

HSS 370 Social Welfare as a Social Institution
Fall. 3 credits.
M W F 9:05–9:55. J. Allen.
A philosophical and historical introduction to social welfare services. The course reviews the social contexts from which programs and the profession of social work have evolved. It discusses the political and ideological processes through which public policy is formed and how policies are translated into social welfare programs. Basic issues in welfare are discussed in the context of present program designs, public concerns, and the interrelationships and support of services in the community.

HSS 400–401–403 Special Studies for Undergraduates
Fall or spring. Credits to be arranged. S-U grades optional.
Hours to be arranged. Department faculty.
For independent study by an individual student in advanced work in a field of HSS not otherwise provided in the department or elsewhere at the university, or for study on an experimental basis with a group of students in advanced work not otherwise provided in the department or at the university. Students prepare a multicopy description of the study they want to undertake on a form available from the Counseling Office. This form must be signed by the instructor directing the study and the department chair and filed at course registration or within the change-of-registration period after registration. To ensure review before the close of the course registration or change-of-registration period, early submission of the special-studies form to the chair is necessary. Students, in consultation with their supervisor, should register for one of the following subdivisions of independent study.

HSS 400 Directed Readings
For study that predominantly involves library research and independent readings.

HSS 401 Empirical Research
For study that predominantly involves data collection and analysis or laboratory or studio projects.

HSS 403 Teaching Apprenticeship
Prerequisite: Students must have taken the course (or equivalent) in which they will be assisting and have demonstrated a high level of performance. For study that includes assisting faculty with instruction.

HSS 414 Professional Internship in Human Service Studies
Fall, spring, or summer. 4–7 credits. Limited to juniors and seniors majoring in human service studies. Prerequisite: FIS 100 or permission of instructor. Pre-course enrollment is required.
Sem, T 1:30–4:25. Placement hours to be arranged. C. Reed.
Students intern for a minimum of 10 hours a week in a human service organization and attend a weekly seminar with a focus on integrating classroom and field-based learning. The course is structured as an opportunity for students to learn experientially and, at the same time, provide meaningful services to human service organizations. Interns are expected to take active roles in structuring, monitoring, and assessing their learning under the guidance of a faculty instructor.

HSS 417 Power and Empowerment in Human Services
Spring. 3 credits. Offered alternate years.
Hours to be arranged. D. Barr.
The course will take a theoretical world view of power and the historically colonial relationship between the American ruling class and other people. The three dimensions of power will be used as the framework for analysis. The relationship between a social class, race, sex, and power will be under study. In addition, the class will explore the nature of empowerment and new theories of power and empowerment.

HSS 426 Crime and Crime Policy
Fall. 3 credits. S–U grades optional. Limited to 35 students.
T R 10:10–12:05. L. Street.
This course is for students who are interested in understanding crime and crime-control policies. The purpose of the course is to learn how to think about crime problems in terms of their social, political, and human service contexts. The following topics are among those addressed in order to realize the objectives of the course: American culture and crime policy; criminal justice agency and system operations; criminal offending and victimization; race and crime; and community crime-control programs. These topics are examined from the vantage point of criminal justice, social justice, and public health perspectives.

[HSS 460 Human Service Planning Methods
Spring. 3 credits. Prerequisite: HSS 292. Not offered 1992–93.
Hours to be arranged. Staff.]

HSS 465 Community Decision Making
Fall. 3 credits. S-U grades optional.
T R 8:30–9:55. A. Hahn.
Identification and discussion of factors that influence the outcome of community issues. Topics include political participation, decision-making processes, the interests and resources of key decision makers, and community change. Concurrent participation in community activities is desirable but not required.

HSS 471–472 Social Work Practice I and II
Introduction to concepts and methods used in a generalist, task-centered model of social work practice. Examination of the values and ethics of professional practice. Students learn skills appropriate for working with individuals, groups, families, and communities. Class content is integrated with concurrent supervised fieldwork. Placements are made in social agencies in Tompkins and surrounding counties. Students are expected to arrange and to pay for their own transportation. A lab fee for field-related expenses will be charged to every student in the course. Each student must have a current driver's license.

HSS 471 Social Work Practice I
Fall. 9 credits. Limited to 25 social work students. Prerequisites: introductory psychology, introductory sociology, one course in human development, grades of C+ or better in HSS 246 and 370, and permission of instructor before registration.
Lecs, M W 10:10–12:05; fieldwork, T R for 8 hours each day. C. Shapiro.

HSS 472 Social Work Practice II
Spring. 9 credits. Limited to 25 social work students. Prerequisites: grade of B– or better in HSS 471 and satisfactory performance in fieldwork.
Lecs, M W 10:10–12:05; fieldwork, T R for 8 hours each day. C. Shapiro.

HSS 473 Section 01 Senior Seminar in Social Work
Spring. 3 credits. Prerequisites: HSS 471–472. (HSS 472 may be taken concurrently).
M W 1:25–2:40. C. Shapiro.
The course integrates and expands on learning from courses in human behavior, social policy, and social work methods. Topics will include professional ethics, human responses to loss, and lifestyle diversity, with an emphasis on integrating theory with issues in professional practice.

HSS 473 Section 02 Senior Seminar
Fall and spring. 3 credits. Prerequisite: field work or permission of instructor. Limited to 18 junior and senior HSS majors.
Hours to be arranged. A. Hahn, fall instructor.
The course will focus on a particular problem, such as poverty, crime, illiteracy, teen pregnancy, and so forth. Solutions to the problem will be sought by applying an understanding of the areas of human service environments, programs, and processes. Specifically, those solutions will be sought via student analysis and definition of the problem, assessments of both current or existing and desired or ideal human services needed to address the problem, and identification of the desired outcomes of such services or of resolution of the problem. Through this process, students will also learn effective ways to create social changes. Work requirements include several individual short papers and a group project.

HSS 475 Social Policy
Spring. 3 credits. Prerequisite: HSS 370 or Government 111 or Sociology 141. S-U grades optional.
M W F 9:05–9:55. J. Allen.
An examination of the policy-making process and the significance of national policies as they affect the distribution of social services. Frameworks for analyzing social policy are used to evaluate existing social programs and service-delivery systems. Implications for change in policies at the national, state, and local levels are discussed.

HSS 476 Housing and Feeding the Homeless (also Hotel Administration 490)
Fall and spring. Variable credit. Limited to juniors, seniors, and graduate students.
T R 11:55–1:10. J. Ford, J. Eyster.
Through lectures, class discussion, and a field placement practicum, students will explore the economic, social, and political issues of our country's growing problem of homelessness and the existing and proposed housing and feeding policies and delivery systems that are attempting to deal with homelessness. Students will study the history of homelessness, the description of the subgroups of the homeless population, and strategies to prevent and alleviate the problem. The fieldwork involved in this course will require approximately eight days spread over the semester at a project location.

Topical Seminars and Practicums

Seminars and practicums, offered periodically and reflecting faculty and student interest, with changing topics and instructors. Content, time, credits, and instructors to be announced. Seminars and practicums offer concentrated study in a specific human service area or in the education, planning, or evaluation processes within human services.

HSS 613 Seminar in Health and Mental Health Services
Fall. 3 credits. Open to undergraduates with instructor's approval.
M W F 10:10–11. J. Mueller.
Administrative and clinical perspectives on the organization and delivery of mental health services. Current ethical concerns and policy issues related to the planning of health and mental health service systems. Assessment of several innovative program models for service delivery to persons who are physically ill or mentally impaired.

HSS 669 Seminar in Program Planning and Development
Topics include microlevel program planning, third-sector organizations, and intergovernmental influences on program planning, policy formation, program implementation, and mainstreaming. Two or more human services are examined.

HSS 697 Seminar in Program Evaluation and Evaluative Research
Fall and spring. 1 credit.
W 12:20–1:10. W. Trochim, fall.
J. Greene, spring.
The seminar is topically organized according to student and faculty projects. Focuses on professional issues in evaluation practice, including consulting, ethics and standards, preparation of conference and publication materials, and various methodological issues.

Continuing Education for Professionals

These courses are not a part of the department's regular graduate offerings but are designed to provide continuing education for professionals through the extramural division.

HSS 507–508 Professional Improvement I and II

Fall, spring, or summer. 3–6 credits. Enrollment is determined by various factors, including nature of content, funding, resources, facilities, and instructor. S-U grades optional. Intended for extramural (evening) and off-campus instruction. May be repeated with the permission of the instructor.
A series of special-problem seminars, classes, and activities designed for in-service and continuing education of practitioners in helping professions, such as home economics teachers, social workers, public health planners, and adult educators. Specific content of each course varies with group being served but includes work and class time appropriate to number of credits.

The Graduate Program

Human service studies graduate courses are open to undergraduates only with the instructor's permission.

The courses listed below will be taught regularly (annually or in alternate years).

HSS 600 Special Problems for Graduate Students

Fall or spring. Credits to be arranged. For students recommended by their chair and approved by the instructor in charge for independent advanced work. S–U grades optional. Department faculty.

HSS 622 Health and Human Services Management

Fall. 3 credits.
T 12:20–2:50. D. Brown.
Designed as an integrating seminar for students interested in health services administration and consulting, the course focuses on the practical application of organization theory and behavior for effective management practice, and attempts to develop the students' problem-solving and decision-making skills through the analysis of cases. The case method is particularly suited to strengthen diagnostic, analytical, conceptual, and managerial skills by facilitating synthesis, integration, and the application of theory to actual situations. A number of major themes are explored, such as matrix organization, governance, professional values and relationships, organization culture, change and leadership, motivation, group processes, management by negotiation, and total quality management.

HSS 625 Health Care Services: Consumer and Ethical Perspectives

Fall. 3–4 credits. Limited to 30 students; undergraduates with permission of instructor. Offered alternate years.
M W 2:30–3:45. A. Parrot.
The course will focus on consumer and ethical issues faced by the health care field today. Broad topics to be discussed include ethical standards and guidelines, health care costs and accessibility of services, government role in health care delivery, private industry role in health care, services for the medically indigent and elderly, practitioner burnout and training, ethics of transplant surgery and funding, reproductive technology, AIDS research and funding, animals in medical research, and baby and granny Doe cases. May be used as Biology and Society Senior Seminar option.

HSS 627 Legal Aspects of Health-Services Delivery

Spring. 3 credits.
Hours TBA. Staff.
This course introduces principles of the law that are specifically applicable to health-services delivery. Topics considered include the liability of hospitals and their staff and personnel for injuries to patients; medical records and disclosure of information; consent to medical and surgical procedures; responsibility for patients' personal property; collection of bills; medical staff privileges; and confidential communications.

[HSS 628 Medical-Service Issues in Health Administration (also Biology and Society 428)

Spring. 3 credits. Limited to 50 students. Not offered 1992–93.
M 2:30–4:45. V. Utermohlen.]

[HSS 629 Strategic Planning and Marketing in Health Care

Spring. 3 credits. Not offered 1992–93.
T 12:20–2:45. D. Brown.]

[HSS 630 Comparative Health-Care Systems: Canada, the United States, and Third World Countries

Fall. 3 credits. Open to graduate students and seniors. Not offered 1992–93.
M 7:30–10 pm. J. Ford.]

HSS 631 Managed Health Delivery Systems: Primary-Ambulatory Care

Spring. 3 credits. S-U grades optional.
T R 2:30–3:45. R. Battistella.
The concept of primary care is used to enhance understanding of the direction and purpose of ongoing changes in health services organization and financing. Pressures on traditional indemnity insurance and solo fee-for-service medicine are examined in the context of the transition from unmanaged to managed delivery systems. The course is divided into two parts: Part 1 examines the development of health maintenance organizations and related forms of managed care against the backdrop of larger public policy concerns. Part 2 centers on administrative-financial topics associated with the design, marketing, and operation of managed delivery systems in highly competitive markets. Considerable attention is given to the relationship between physicians and management with respect to such subjects as medical practice styles, productivity, quality assurance, and outcome measurement. The consumer health care behavior literature is reviewed in the light of marketing strategies and utilization control objectives. Many of the managerial topics are amplified by field trips and a select group of visiting speakers.

HSS 632 Labor Relations in the Health Industry

Spring. 1 credit.
W 4–6:30 (course meets for 5 sessions only). W. Abelow.
This course provides an overview of major topics and current issues concerning unionization in the health industry. It emphasizes a practical, direct approach to dealing with union organizing and elections, collective bargaining, strikes, and labor contract administration in the health industry. The history of unionization in the field and an analysis of applicable laws are covered. Particular emphasis is placed on the role of government and other regulatory agencies in the negotiation process. Students work with current actual cases and materials. Students have the option of taking a final examination or submitting a short research paper.

HSS 633 HMO Development and Management

Spring. 1 credit.
T 4–6 (course meets for 5 sessions only). Staff.
The major goal of this course is to provide students with the conceptual framework for understanding the role of health maintenance organizations (HMOs) in today's health economy and to provide an introduction to the planning, development, and operation of HMOs.

HSS 634 Health Care Organization—Providers and Reimbursement

Fall. 3 credits. Limited to 30 students. Prerequisite: graduate standing or permission of the instructor.
T R 12:20–1:35. J. Kuder.
The course will provide an introduction at the graduate level to the organization of health providers in the United States, the interrelationships of health services, and major sources and methods of paying for care. The course will describe how health services are structured in the United States and how these different services interrelate along the continuum of care. The course will describe and analyze the different sources of payments and how reimbursement policies affect the type and location of care provided. Innovations by the public and private sectors in the delivery and reimbursement of health care will also be presented.

HSS 635 Field Studies in Health Administration and Planning

Fall or spring. 1–4 credits.
Hours to be arranged. Health faculty.
Students interested in developing administrative and program-planning research skills are given an opportunity to evaluate an ongoing phase of health care agency activity in the light of sound administrative practice and principles of good medical care. In planning and carrying out the research, students work closely with a skilled practicing administrator and with members of the school's faculty.

HSS 636 Financial Management of Health and Human Service Organizations

Spring. 3 credits. Limited to 30 students. Prerequisite: a financial accounting course or permission of instructor.
MW 11:15–12:30. J. Kuder.
The objectives of the course are to provide students with an intensive introduction to the financial management skills required of health and human service administrators and to acquaint students with the application of corporate financial tools to the problems of complex health systems. The course presents an overview of the financial markets and the financing methods of health and human service organizations. It will focus mainly on health-care organizations, but the financial practices and approaches presented in the readings and class discussions will also be appropriate to other human service agencies. In addition to discussing acute-care hospitals, the course will present an understanding of the financial management of long-term-care facilities, HMOs, home health care, hospice programs, and other human-service programs.

[HSS 652 Preparing Professionals in the Human Services
Spring. 3 credits. S-U grades optional. Not offered 1992–93.]

HSS 655 Leadership in Human Services
Spring. 3 credits. Limited to 20 students. S-U grades optional. Offered alternate years.
W 7:30–10 p.m. R. Babcock.
The course surveys some classic and contemporary leadership theories and their associated theories of personality and motivation. Human service organizations are examined in terms of their unique leadership needs and responses to various leadership styles. Through lectures, case analyses, visiting speakers, and student presentations, the relationships between leadership theories and the special features of human service organizations are explored. Translating leadership theory into practice is emphasized. Special leadership topics, such as gender and race, volunteerism, ethics, and working with boards of directors, will be considered, according to class interest.

HSS 658 Professional Ethics and Public Policy
Spring. 3 credits.
T R 12:20–2:15. J. Ziegler.
This course will explore current issues of ethics and public policy against a background of theories of ethical behavior. Questions of how public officials and managers of public and non-profit agencies and private enterprises act will be examined. How do standards of ethical behavior in the professions get established? How are public policy issues with ethical implications resolved? Readings will be drawn from political philosophy, contemporary social science, and imaginative writing. Class participation is essential. Open to seniors and graduate students.

HSS 660 Social Policy and Program Planning in Human Services
Spring. 3 credits. S-U grades optional.
M W F 11:15–12:05. J. Allen.
A review of the public policy process in education, health, and social welfare services as it pertains to program development. The course includes the history, definitions, and boundaries of the policy process; the relationships of the policy process to political economy, social structure, intergovernmental relations, and cultural values and beliefs; theories of planning and program development in human services; the role of evaluation in program planning and implementation, with special emphasis on monitoring and feedback of effects into the policy and planning process; selected current issues in policy and planning processes, such as regulatory and legislative constraints; the respective roles of clients or consumers and professional planners and providers; and problems and prospects in the coordination among the various human services.

HSS 661 Designing and Funding Health and Human Service Programs
Spring. 3 credits.
M 4–7. J. Mueller.
This seminar focuses on the processes of proposal writing, which include documentation of need and significance of the project in light of the values in health and human services professions; plan for proposed intervention (if applicable); review of relevant literature; design of a staffing plan and issues related to choices for staffing different types of programs (if applicable); work flow chart; affirmative action plan; appropriate budget to support the scope of the proposed work; documentation of support from relevant community agencies; and design for an evaluation of the project (if applicable) or dissemination of fundings (if a policy analysis.) Special attention will be given to the identification of public and private sector resources for funding health and human services projects.

[HSS 664 The Intergovernmental System
Fall. 3 credits. Open to seniors who have had a course in American government and graduate students. Not offered 1992–93.
T R 2:30–4. J. Ziegler.]

[HSS 665 Human Service Politics in the Local Arena
Fall. 3 credits. Offered alternate years. Not offered 1992–93.
Hours to be arranged. A. Hahn.]

HSS 670 Management in Public and Nonprofit Organizations
Fall. 3 credits.
T 6:30–9 p.m. R. House.
This course presents an overview of organization and management theory, i.e., contributions of public and nonprofit management theorists and implications for managing home service organizations. The focus of the course will be managing a systems-designed simulation of a nonprofit human service organization, including defining goals, serving multiple constituencies, relating to governing boards, solving financial problems, and evaluating organizational effectiveness. Students will read theoretical and case study literature to become familiar with conceptual and managerial issues that confront managers of human service nonprofit organizations.

HSS 671 Decision Tools for Administrators and Planners
Spring. 3 credits.
T 6:30–9 p.m. Staff.
This is a decision course that will familiarize students with a variety of tools that can be used to conceptualize problems, decision alternatives, criteria, and futures and to essentially improve the decision-making process. Students will acquire a basic understanding of how people cope with decisional conflicts and the sources of error in decision processes. They will also be introduced to techniques that can be applied in making decisions.

HSS 672 Management Information Systems in Health and Human Services
Spring. 3 credits.
W 9–11:30.
This course reviews how information systems can be developed and made useful for administrators and other professional staff in human services. Readings and assignments reflect a balance between technical and organizational or human aspects of information systems. Major topics include the organizational and managerial context for information systems in the human services, approaches to systems analysis and database development, data analysis for decision making, and presenting information for understanding programs and policies. Students will do computer assignments and case studies of management information systems issues in human service and other organizational settings.

[HSS 674 Organizational Behavior in Human Services
Spring. 3 credits. Limited to 20 students. S-U optional. Offered alternate years; next offered 1993–94.
W 7:30–10 p.m. R. Babcock.]

[HSS 685 Health and Welfare Policy
Fall. 3 credits. Not offered 1992–93.
T R 10:10–11:25. R. Battistella.]

HSS 688 Long-Term Care and the Aged: Alternative Health and Social Service Delivery Systems
Spring. 3 credits.
T R 9–10:15. R. Battistella.
Alternatives for the organization and delivery of long-term care services are examined within the context of public-financing constraints. Progressive long-term care is viewed as a continuum encompassing medical and social services positioned to optimize independent living. Relevant experience from other highly developed countries is presented. Visiting speakers from the government and the private sector are featured, and field trips provide additional insights into the many challenges and opportunities in long-term care policy and management.

HSS 690 Measurement for Program Evaluation and Research
Fall. 3 credits.
M W 11:15–12:30. Staff.
The course reviews measurement theory and its application to the evaluation of human service programs. Topics include validity; reliability; scaling methods; basic principles of instrument design; and varied methods of data collection with an emphasis on structured questionnaires and interviews. Student work is focused around an applied course project. Attention is also given to ethical and managerial issues that arise in applied measurement settings.

HSS 691 Program Evaluation and Research Design
Spring. 3 credits.
M W 10:10–11:25. W . Trochim.
This course reviews research design and its application to the evaluation of human service programs. Major topics include experimental, quasi-experimental, and nonexperimental research designs; basic sampling and measurement theory; and the theory of validity in research. Attention is given to issues that arise in the application of research designs to the evaluation of programs, including problems of randomization, causal inference, replication, and utilization of results. The central role of the general linear model in the statistical analysis of outcome evaluation is presented through case examples and computer simulation. Students will encounter examples of outcome evaluations from a wide range of disciplines including health, mental health, social welfare, criminal justice, social policy, and education.

[HSS 692–693 Program Evaluation in Theory and Practice
692, fall; 693, spring. 4 credits each semester. Prerequisites for HSS 692: 690 and 691 or 696, or permission of instructor. Prerequisite for HSS 693: 692. Students must register for both semesters. Offered alternate years. Not offered 1992–93; next offered 1993–94.
M W 2:30–3:45. W. Trochim.
This course constitutes a one- or two-semester practicum in which the class designs and conducts a program evaluation in the human services. Students are involved in all phases

of the evaluation from design through the production and dissemination of a final report. Emphasis is on research methods in the social sciences. Application of knowledge developed in prerequisite courses is stressed (for example, planning and managing an evaluation, ethics, methods of data collection, data processing, and strategies for analysis and feedback of results).]

HSS 695 Strategies for Policy and Program Evaluation
Fall. 3 credits. Prerequisites: HSS 690 and 691 or 696, or equivalent. Offered alternate years.
T R 10:10–11:25. J. Greene.
This course examines a wide range of approaches to the evaluation of policies and programs in the human services. The approaches are examined with respect to their purposes, key audiences, and methodologies, as well as their philosophical, political, and value frameworks. Analysis of commonalities and differences across evaluation approaches is used to judge the appropriateness of a given strategy for a particular context.

HSS 696 Qualitative Methods for Program Evaluation
Spring. 3 credits. Prerequisites: HSS 690 and 691 or equivalent.
T R 10:10–11:25. J. Greene.
This course presents a qualitative approach to applied research and the evaluation of human service programs. Topics include the epistemological assumptions underlying this approach, questions of entry into setting, methods for data collection and data analysis, reporting, confidentiality of participants, and the ethics of qualitative inquiry. The course aims to help students understand how, when, and why a qualitative approach to social inquiry can be used appropriately and effectively and how qualitative and quantitative approaches might be mixed effectively.

HSS 699 MPS Problem Solving Project
Fall or spring. Credits to be arranged. For students recommended by their chair and approved by the instructor in charge for independent advanced work. S-U grades optional.
Field faculty.

HSS 704–705 Internship in Human Service Studies
Fall, spring, or summer. 1–15 credits. S-U grades optional.
Hours to be arranged. Graduate faculty.
Internship placement in human services is determined by availability and students' academic and professional goals. Opportunities are available in public and private, human service organizations at the national, state, and local levels in positions consistent with students' needs and desires. The duration of an internship is negotiated between the student and the agency, while course credit and residence units are arranged between the student and the Special Committee.

HSS 790 Advanced Seminar in Program Evaluation
Spring. 3 credits. S-U grades optional. Prerequisite: permission of instructor.
T R 2:30–3:45. W. Trochim.
This course is intended for students with at least three courses in evaluation (HSS 690 series or equivalent) and statistics through multiple regression. The seminar focuses on analysis and appraisal of current literature on program evaluation and evaluative research, with emphasis on the links between program evaluation and program planning and administration. Attention is given to two or more service areas (education, health, social welfare) and to applications across those areas.

HSS 899 Master's Thesis and Research
Fall and spring. Credit to be arranged. Prerequisite: permission of the chair of the graduate committee and the instructor. S-U grades optional.
Hours to be arranged. Department graduate faculty.

HSS 999 Doctoral Thesis and Research
Fall and spring. Credit to be arranged. Prerequisite: permission of the chair of the graduate committee and the instructor. S-U grades optional.
Hours to be arranged. Department graduate faculty.

TEXTILES AND APPAREL COURSES

S. K. Obendorf, chair, A. Netravali, graduate faculty representative; P. Schwartz; undergraduate advising coordinator; S. Ashdown, C. C. Chu, C. Coffman, M. Govindaraj, C. Jirousek, A. T. Lemley, A. Racine, N. Saltford, L. Wagenet, S. M. Watkins

TXA 114 Introduction to Computer-aided Design
Fall. 3 credits. Limit 20, with 10 per lab section. Priority given to TXA and DEA students. S–U grades optional.
Lec M W 9:05; Lab F 11:15 or F 12:20. S. Ashdown.
A studio course that focuses on using the microcomputer as a design tool. The command-driven AutoCAD software program is the medium of expression for creating, modifying, and plotting visual images. Students will develop two-dimensional surface designs based on historical and cultural artifacts from the Cornell Costume Collection. Approximate cost of supplies is $80.00.

TXA 117 Drawing the Clothed Figure
Spring. 3 credits. Enrollment limited to 18 students. A basic drawing course is highly recommended. Priority given to TXA Option I students. S–U grades optional. Approximate cost of textbook $30.00; minimum cost of supplies $40.00
T R 9:05–12:05. C. Garner.
To improve the student's ability to illustrate two-dimensionally the interaction of draped fabric and the human form and to develop awareness of clothing as a design medium. Emphasis is on development of techniques and skills in selected media necessary for the communication of design ideas.

TXA 125 Art and Visual Thinking
Fall. 3 credits. S-U grades optional.
Lecs, T R 2:30–4. C. Jirousek.
An introduction to the visual arts and design that explores aesthetic and cross-cultural dimensions of visual experience. Augmented by slide presentations and films, lectures emphasize relationships between visual forms and technology and social, political, and cultural interpretations that distinguish works of art from other man-made objects. Museum and gallery visits arranged when feasible.

[TXA 144 Introduction to Apparel Design
Summer only. 3 credits. Limited to 20 students. Not offered 1992. Cost of supplies and materials, $50.
A. Racine.
In designing apparel through the flat-pattern method, students use original sketches and develop full-scale patterns for individual and group projects that are brought to various stages of completion. Creative expression and a thorough understanding of principles and techniques needed to produce apparel is emphasized.]

TXA 145 Apparel Design I
Spring. 4 credits. Limited to 26 students; priority given to TXA majors or students transferring into TXA. Apparel design majors should take course during the first year. Minimum cost of materials, $125; lab fee, $10.
Lecs M W 9:05; lab T 12:20–2:15 or F 12:20–2:15. A. Racine.
Intensive study of principles and processes of flat-pattern design with emphasis on creative expression in fashion apparel. Students develop a thorough understanding of principles and techniques needed to produce apparel.

TXA 146 Clothing: The Portable Environment
Fall. 3 credits. Average cost of materials, $30; lab fee, $10.
Lec, T R 10:10–11:40. S. Watkins.
An introduction to the design of clothing for a variety of occupations and climates for individuals of varying ages, for sports and recreation, and for hazardous environments such as under water or outer space.

TXA 235 Introduction to Fiber and Textile Science
Fall. 3 credits. Students who have taken TXA 238 may not register for TXA 235.
Lecs, M W F 9:05. P. Schwartz.
An introduction to the basic properties of fibrous materials and structures. Special emphasis is given to the fundamental properties of fiber-forming materials, the processes involved in their conversion into fabrics, and their end uses. This course is designed to provide a basis for further study in textiles, but it is also sufficiently broad to be appropriate as an elective course for students outside of the major.

TXA 238 Textiles for Interiors
Fall. 3 credits. S–U grades optional. Students who have taken TXA 235 may not register for TXA 238.
M W F 9:05. P. Schwartz and K. Obendorf.
An introduction to textile materials and products for residential and contract interiors. Students learn to select fibers and fabrics based on their properties and product end-use requirements. Product performance evaluation and specification are stressed.

TXA 245 Dress: A Reflection of American Women's Roles
Fall. 3 credits. S-U grades optional.
M W 12:20–2:15. C. Jirousek.
Historical survey of changing patterns of American women's dress from the colonial period to the present day and of cultural, economic, and political forces that affected changes and women's development. Slides, film clips, and the Cornell University Costume Collection will be used for lectures and discussion.

TXA 264 Apparel Design II
Fall. 4 credits. Each section limited to 10 students. Prerequisite: TXA 145. Recommended: one art or drawing course. Apparel design majors should take TXA 264 and 367 in the same academic year, preferably during the sophomore year. Minimum cost of materials, $125; lab fee, $10.

M W 1:25–4:25. S. Ashdown.
This studio course examines the process of creating a three-dimensional garment from the two-dimensional fabric. Through exercises, principles and processes of draping, advanced flat pattern making, and fitting are studied. Assigned problems require the students to make judgments regarding the design process, the nature of materials, body structure, function, and fashion.

TXA 300 Special Studies for Undergraduates
Fall or spring. Credit to be arranged.

Hours to be arranged. Department faculty.
Special arrangement for course work to establish equivalency for courses not transferred from a previous major or institution. Students prepare a multicopy description of the study they want to undertake on a form available from the Student Services Office. The form, signed by both the instructor directing the study and the department chair, is filed at course registration or during the change-of-registration period.

TXA 301 Investigative Research on the Social Impact of Science (also Biology and Society 300 and Science and Technology Studies 402)
Spring. 4 credits. Prerequisite: one year of science. Limited to 20 students.

M W 2:30–4:25. P. Schwartz, P. Taylor.
Students choose a current issue regarding the social impact of science and work through the steps of investigation: issue definition, background bibliographic and comparative research, making contacts and interviewing, making and revising written and spoken presentations, proposals for action. In a workshop setting students comment on and learn from each other's projects. Guest speakers, films, discussion of articles, and case studies illustrate themes of explanation, argument, modes of research, expertise, ways of knowledge, possibilities of research, action, and public participation.

TXA 331 Apparel Production Technology
Fall. 3 credits. Prerequisites: Economics 101 and 102 or CEH 110 and 111 and an upper-division course in either apparel or textiles.

Lecs, T R 8:30–9:55. M. Govindaraj.
Introduction to technical and economic aspects of textile and apparel production. Emphasis is on design and functioning of apparel manufacturing systems and their components. Analysis of efficient manufacturing methods such as Quick Response (QR), Just-in-Time (JIT) as applicable to apparel production, and use of computer technology in production and quality control will be included.

[TXA 336 Fundamentals of Color and Dyeing
Fall. 4 credits. Prerequisite: College Natural Science Requirements. Lab fee, $15. Not offered 1992–93.

Lecs, M W F 10:10–11; lab, M 1:25–4:25. C. C. Chu.
Color is an extremely important and useful factor in everybody's daily life, e.g., the clothes we wear, the food we eat, the house we live in. This course will emphasize theories and scientific principles of color, providing a framework for the use of colors in design, marketing, or research. How colorants are used to dye fabrics will be addressed. Although fabrics are chiefly used to illustrate color in the class, much of the information and knowledge will be useful to non-textile majors. Guest lecturers from industry will provide the practical aspects of color in business.]

TXA 337 Formation and Structure of Textile Fabrics
Spring. 3 credits. Prerequisite: TXA 235. Recommended: college algebra.

Lecs, M W F 9:05. A. Netravali.
This course covers the methods of fabric manufacture and their influence on fabric properties and the potential applications of fabrics. The technical aspects of textile fabrics are covered in detail. Properties of woven, knitted, and nonconventional fabrics, methods of producing structural designs, and means of designing fabrics to specifications are covered.

TXA 367 Apparel Design III
Spring. 3 credits. Prerequisite: TXA 114 and TXA 264. Recommended: two art or drawing courses. Apparel design majors should take TXA 264 and 367 in the same academic year, preferably during the sophomore year. Minimum cost of materials, $175; lab fee, $10.

M W 10:10–12:05. A. Racine.
Advanced apparel students prepared to challenge and refine their design skills will be presented with a variety of complex studio problems including computer-aided apparel design. The Cornell Costume Collection is used for illustration and inspiration.

TXA 375 Visual Studies: Color and Surface Design
Spring. 3 credits. Minimum cost of materials, $75; lab fee, $10.

T R 1:25–4:25. Staff.
This studio experience is augumented by slide presentations that demonstrate the use of decorative and repeat patterns as an applied textile art form; lecture materials reference both the history and current trends in surface design and color. Projects explore design problem-solving skills, systems of color classification, and principles of two-dimensional form; portfolio presentation skills are emphasized.

TXA 400–401–402–403 Special Independent Studies for Undergraduates
Fall or spring. Credits to be arranged. S-U grades optional.

Hours to be arranged. Department faculty.
For advanced independent study by an individual student or for study on an experimental basis with a group of students in a field of TXA not otherwise provided through course work in the department or elsewhere at the university. Students prepare a multicopy description of the study they want to undertake on a form available from the Counseling Office. This form must be signed by the instructor directing the study and the department chair and filed at course registration or within the change-of-registration period after registration. To ensure review before the close of the course registration or change-of-registration period, early submission of the special-studies form to the department chair is necessary. Students, in consultation with their supervisor, should register for one of the following subdivisions of independent study.

TXA 400 Directed Readings
For study that predominantly involves library research and independent reading.

TXA 401 Empirical Research
For study that predominantly involves data collection and analysis, or laboratory or studio projects.

TXA 402 Supervised Fieldwork
For study that involves both responsible participation in a community setting and reflection on that experience through discussion, reading, and writing. Academic credit is awarded for this integration of theory and practice.

TXA 403 Teaching Apprenticeships
Fall or spring. 2–4 credits. Prerequisites: student must have upperclass standing, have demonstrated a high level of performance in the subject to be taught and in the overall academic program, and have permission of the instructor and the department chair. S-U grades only.

Apprenticeship includes both a study of teaching methods in the field and assisting the faculty with instruction.

TXA 405 Organizations and Policies in the Federal System
Spring. 3 or 4 credits. S–U grades optional. Prerequisite: upperclass standing.

T R 10:10–11:25. N. Saltford.
Course examines how Congress and the federal agencies function within the context of salient political, legal, and social influences, including private organizations and associations. Using computers to track pending legislation, students analyze and critique policy issues relevant to their own area of subject matter. Optional spring break trip to Washington (for the extra one credit).

TXA 432 Product Quality Assessment
Spring. 3 credits. Prerequisites: TXA 235 and Statistics. Lab fee, $15.

Lecs, M W 1:25–2:15; lab, M W 2:30–4:25. A. Netravali.
This course covers evaluation of fibers, yarns, fabrics, and garments, with emphases on the meaning of standards, testing philosophy, quality control, and statistical analysis. Day-to-day tests done in textile and apparel industry will be discussed. Laboratory sections will introduce students to various test methods, data generation for analysis, and evaluation.

TXA 439 Biomedical Materials and Devices for Human Body Repair
Spring. 3 credits. S-U grades optional. Prerequisites: College Natural Science Requirement. Juniors and seniors preferred. (Chem. 103–104, or Biol. 101–103).

Lecs,T 1:25–4:25. C. C. Chu.
Survey of materials and devices for repair of injured, diseased, or aged human tissues/organs. It includes properties of synthetic and biological materials, wound healing processes, medical devices for repair of wounds, blood vessels, hearts, joints, bones, nerves, male impotence, vision/hearing/voice, and drug control/release.

[TXA 446 Apparel Design: Intermediate Functional Clothing Design
Spring. 3 credits. Prerequisites: TXA 146 and TXA 264 or permission of instructor. Minimum cost of materials, $125; lab fee, $10. Not offered 1992–93.
Lecs,T R 9:05–12:05. S. Watkins.
Advanced physical theory concerned with the function of clothing with a focus on totally encapsulated clothing for chemical protection. Special current topics in the field will be studied. Students will be engaged in both group and individual research projects that result in the design and development of apparel items.]

TXA 465 Apparel Design: Product Development and Presentation
Spring. 3 credits. Prerequisites: minimum of three drawing or art courses and TXA 367 or permission of instructor. Minimum cost, $125; lab fee, $10.
T R 10:10–12:05. S. Ashdown.
Through studio problems in apparel design, students examine the influence of manufacturing technology and cost on apparel products. Garments are developed to various stages from sketches to finished samples. Some portfolio development included.

TXA 600 Special Problems for Graduate Students
Fall or spring. Credit to be arranged. S-U grades optional.
Hours to be arranged. Department faculty.
Independent advanced work by graduate students recommended by their chair and approved by the department chair and instructor.

[TXA 620 Physical Properties of Fiber-Forming Polymers and Fibers
Fall. 3 credits. Prerequisite: permission of instructor. Not offered 1992–93.
Lecs, T R 2:30–3:45. A. Netravali.
Formation and properties of fiber-forming polymers, rubbery, glassy, and crystalline states and their interconnection. Fiber structure, relationship between chemical structure and physical properties of man-made and natural fibers. Mechanical, thermal, and viscoelastic properties of fibers and testing methods will be discussed.]

[TXA 621 Characterization of Fibrous Materials
Spring. 3 credits. Prerequisite: TXA 620 or permission of instructor. S-U grades optional. Not offered 1992–93.
M W F 12:20. P. Schwartz.
A study of the principles of the major analytical characterization methods and the application of these methods to the study of fiber properties and structure. Topics include microscopy, x-ray diffraction, spectroscopy, magnetic resonance, and mass spectrometry.]

[TXA 635 Special Topics in Textiles and Apparel
Fall. 1–3 credits. Prerequisite: permission of instructor. Not offered 1992–93.
Staff.]

TXA 636 Fiber Chemistry
Fall. 3 credits. Prerequisite: permission of instructor. Offered alternate years.
Lecs, M W F 11:15. A. Netravali.
An in-depth coverage of the important natural and synthetic fibers currently being used in industry, agriculture, medicine, apparel, and engineering. They include cellulose, silk, wool, polyesters, polyamides, polyolefins, acrylics, and polyaramids. In each fiber, the synthesis of polymer, fiber formation, and structure, chemical and physical properties, and applications will be discussed.

TXA 637 Graduate Seminar in Textiles and Apparel
Fall and spring. No credit. S-U only.
R 12:20–1:10. S. Ashdown, fall;
A. Netravali, spring.
New developments, research, and topics of major concern to the field of textiles and apparel are discussed by faculty members, students, and speakers from industry, government, and academia.

TXA 639 Mechanics of Fibrous Assemblies
Spring. 3 credits. Prerequisite: permission of instructor. Offered alternate years.
M W F 10:10. P. Schwartz.
A study of the mechanics of fiber assemblies: creep phenomena and dynamic properties; idealized yarn and fabric models; statistical bundle theories; deformation of yarns and fabrics in tensile, shear, and compression stress; bending and buckling; and the mechanical behavior of nonwoven textile materials.

[TXA 664 Human Factors: Anthropometrics and Apparel
Spring. 3 credits. S–U grade optional. Limit 15. Prerequisite: permission of instructor. Open to advanced undergraduates. Not offered 1992–93.
T R 2:30–4:25. S. Ashdown.
Seminar course focusing on the human form and its relationship to clothing. Includes discussion of quantification of body sizes and human variation; historical, cultural, and aesthetic concepts of fit; apparel fitting techniques; national and international sizing systems and standards; impact of sizing systems on various populations (elderly, handicapped, etc.).]

TXA 899 Master's Thesis and Research
Fall or spring. Credits to be arranged. Prerequisite: permission of the chair of the graduate committee and the instructor. S-U grades optional.
Hours to be arranged. Field graduate faculty.

TXA 999 Doctoral Thesis and Research
Fall or spring. Credit to be arranged. Prerequisite: permission of the chair of the graduate committee and the instructor. S-U grades optional.
Hours to be arranged. Field graduate faculty.

FACULTY ROSTER

Allen, Josephine A., Ph.D., U. of Michigan. Assoc. Prof., Human Service Studies
Anderson, Carol L., Ph.D., Iowa State U. Assoc. Prof., Human Development and Family Studies
Ashdown, Susan, Ph.D., U. of Minnesota. Asst. Prof., Textiles and Apparel
Avery, Rosemary J., Ph.D., Ohio State U. Asst. Prof., Consumer Economics and Housing
Avery, Robert B., Ph.D., U. of Wisconsin. Prof., Consumer Economics and Housing
Babcock, Robert J., Ed.D., Cornell U. Assoc. Prof., Human Service Studies
Barr, Donald J., Ph.D., Indiana U. Prof., Human Service Studies
Battistella, Roger M., Ph.D., U. of Michigan. Prof., Human Service Studies
Becker, Franklin D., Ph.D., U. of California at Davis. Prof., Design and Environmental Analysis
Beckman, Ronald H., M.S., Pratt Inst. Assoc. Prof., Design and Environmental Analysis
Biesdorf, Heinz B., Ph.D., U. of Innsbruck (Austria). Prof. Emeritus, Consumer Economics and Housing
Boegly, Carolyn O., M.S., U. of Wisconsin. Assoc. Prof., Cooperative Extension
Boyd, D. Michael, B.A., U. of North Iowa. Prof., Design and Environmental Analysis
Bronfenbrenner, Urie, Ph.D., U. of Michigan. Jacob Gould Schurman Professor, Human Development and Family Studies, Professor Emeritus
Brumberg, Joan J., Ph.D., U. of Virginia. Assoc. Prof., Human Development and Family Studies
Bryant, W. Keith, Ph.D., Michigan State U. Prof., Consumer Economics and Housing
Bushnell, Allen R., M.F.A., Cranbrook Acad. of Art. Assoc. Prof., Design and Environmental Analysis
Canfield, Rick, Ph.D., U. of Danver. Asst. Prof., Human Development and Family Studies
Ceci, Stephen J., Ph.D., U. of Exeter (England). Prof., Human Development and Family Studies
Chi, Peter S., Ph.D., Brown U. Prof., Consumer Economics and Housing
Chu, Chih-Chang, Ph.D., Florida State U. Assoc. Prof., Textiles and Apparel
Cochran, Moncrieff, Ph.D., U. of Michigan. Prof., Human Development and Family Studies
Condry, John C., Ph.D., U. of California at Los Angeles. Prof., Human Development and Family Studies
Cornelius, Steven W., Ph.D., Pennsylvania State U. Assoc. Prof., Human Development and Family Studies
Danko, Sheila, M.I.D., Rhode Island School of Design. Asst. Prof., Design and Environmental Analysis
Doris, John L., Ph.D., Yale U. Prof., Human Development and Family Studies
Eckenrode, John J., Ph.D., Tufts U. Assoc. Prof., Human Development and Family Studies
Eshelman, Paul E., M.F.A., U. of Illinois. Assoc. Prof., Design and Environmental Analysis
Firebaugh, Francille M., Ph.D., Cornell U. Prof., Consumer Economics and Housing
Ford, John L., Ph.D., U. of Michigan. Prof., Human Service Studies
Garner, Clark E., M.F.A., U. of Kansas. Assoc. Prof., Design and Environmental Analysis
Gerner, Jennifer L., Ph.D., U. of Wisconsin. Assoc. Prof., Consumer Economics and Housing
Govindaraj, Muthu, C.Sc., C. of Mechanical and Textile Engineering (Czechoslovakia). Asst. Prof., Textiles and Apparel
Greene, Jennifer C., Ph.D., Stanford U. Assoc. Prof., Human Service Studies
Hahn, Alan J., Ph.D., Indiana U. Assoc. Prof., Human Service Studies
Hamilton, Stephen F., Ed.D., Harvard U. Prof., Human Development and Family Studies
Haugaard, Jeffrey, Ph.D., U. of Virginia. Asst. Prof., Human Development and Family Studies
Hazan, Cindy, Ph.D., U. of Denver. Asst. Prof., Human Development and Family Studies

Heck, Ramona K.Z., Ph.D., Purdue U. Assoc. Prof., Consumer Economics and Housing
Hedge, Alan, Ph.D., U. of Sheffield (England). Assoc. Prof., Design and Environmental Analysis
Hogarth, Jeanne M., Ph.D., Ohio State U. Assoc. Prof., Consumer Economics and Housing
Koslowski, Barbara, Ed.D., Harvard U. Assoc. Prof., Human Development and Family Studies
Kuder, John, Ph.D., U. of Michigan. Assoc. Prof., Human Service Studies
LaQuatra, Joseph Jr., Ph.D., Cornell U. Asst. Prof., Design and Environmental Analysis
Lazar, Irving, Ph.D., Columbia U. Prof. Emeritus, Human Service Studies
Lee, Lee C., Ph.D., Ohio State U. Assoc. Prof., Human Development and Family Studies
Lemley, Ann T., Ph.D., Cornell U. Assoc. Prof., Textiles and Apparel
Lenzenweger, Mark. F., Ph.D. Yeshiva U. Asst. Prof., Human Development and Family Studies
Lillard, Dean R., U. of Chicago. Asst. Prof., Consumer Economics and Housing
Lust, Barbara C., Ph.D., City U. of New York. Assoc. Prof., Human Development and Family Studies
McClintock, Charles C., Ph.D., SUNY at Buffalo. Prof., Human Service Studies, Associate Dean
Mathios, Alan, Ph.D., U. of Pennsylvania. Assoc. Prof., Consumer Economics and Housing
Maynes, E. Scott, Ph.D., U. of Michigan. Prof., Consumer Economics and Housing
Millican, G. Cory, M.F.A., U. of Florida. Assoc. Prof., Design and Environmental Analysis
Minot, Marion E., Ph.D., Cornell U. Prof., Human Service Studies
Moen, Phyllis, Ph.D., U. of Minnesota. Prof., Human Development and Family Studies
Mont, Daniel M., Ph.D., U. of Wisconsin at Madison. Asst. Prof., Consumer Economic and Housing
Mueller, B. Jeanne, Ph.D., U. of Wisconsin. Prof., Human Service Studies
Netravali, Anil, Ph.D., North Carolina State U. Asst. Prof., Textiles and Apparel
Noble, Lucinda A., Ph.D., U. of North Carolina. Prof., Human Service Studies
Obendorf, Sharon K., Ph.D., Cornell U. Prof., Textiles and Apparel
Ostrander, Edward R., Ph.D., U. of Illinois. Assoc. Prof., Design and Environmental Analysis
Parrot, Andrea, Ph.D., Cornell U. Asst. Prof., Human Service Studies
Pollak, Patricia B., Ph.D., Syracuse U. Assoc. Prof., Consumer Economics and Housing
Potts, Marion H., Ph.D., Penn State U. Prof., Human Development and Family Studies
Ricciuti, Henry N., Ph.D., Fordham U. Prof. Emeritus, Human Development and Family Studies
Robertson, Steven S., Ph.D., Cornell U. Assoc. Prof., Human Development and Family Studies
Robinson, Jean R., Ph.D., Radcliffe C. Prof. Emeritus, Consumer Economics and Housing
Saltford, Nancy C., Ph.D., Purdue U. Prof., Textiles and Apparel
Savin-Williams, Ritch C., Ph.D., U. of Chicago. Assoc. Prof., Human Development and Family Studies
Schwartz, Peter, Ph.D., North Carolina State U. Assoc. Prof., Textiles and Apparel
Shapiro, Constance H., Ph.D., Cornell U. Prof., Human Service Studies
Sims, William R., Ph.D., Massachusetts Inst. of Technology. Prof., Design and Environmental Analysis
Street, Lloyd C., Ph.D., U. of California at Berkeley. Assoc. Prof., Human Service Studies
Suci, George J., Ph.D., U. of Illinois. Prof., Human Development and Family Studies
Trochim, William M. K., Ph.D., Northwestern U. Assoc. Prof., Human Service Studies
Trzcinski, Eileen, Ph.D., U. of Michigan. Asst. Prof., Consumer Economics and Housing
Watkins, Susan M., M.S., Pennsylvania State U. Prof., Textiles and Apparel
Wethington, Elaine, Ph.D., U. of Michigan. Asst. Prof., Human Development and Family Studies
Yerka, Bettie L., Ph.D., Syracuse U. Prof., Human Service Studies
Ziegler, Jerome M., M.A., U. of Chicago. Prof., Human Service Studies
Zorn, Peter M., Ph.D., U. of California at Davis. Assoc. Prof., Consumer Economics and Housing

NEW YORK STATE SCHOOL OF INDUSTRIAL AND LABOR RELATIONS

ADMINISTRATION

David B. Lipsky, dean

Robert Smith, associate dean, academic affairs

Ronald L. Seeber, associate dean, extension and public affairs

Jonathon Levy, assistant dean, administration

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Frances Benson, director, publications

Tom Herson, director of budget

Lawrence K. Williams, graduate faculty representative

Donald Cullen, editor, *Industrial and Labor Relations Review*

DEGREE PROGRAM

	Degree
Industrial and Labor Relations	B.S.

THE SCHOOL

The School of Industrial and Labor Relations at Cornell (ILR) is a small school within a large university, and it tries to maintain the small-college atmosphere that would be expected of an institution that has about 630 undergraduates and approximately 100 graduate students.

The school is located in a unified complex of classroom buildings, library, and administrative and faculty offices clustered around two courtyards. Daily classroom activities and other school events provide opportunities for students and faculty to interact. ILR students are members of the larger Cornell community and participate fully in its programs.

Almost half of the school's typical freshman class comes from the greater New York City area. Another 30 percent live in other parts of New York State. Students from other states and a few from foreign countries make up the rest of the class. Women constitute about 50 percent of recent entering classes, and minority students comprise about 20 percent of new freshmen and transfer students.

Students enrolled in the School of Industrial and Labor Relations at Cornell may take a substantial number of courses in the other six undergraduate colleges and schools of the university, including the College of Arts and Sciences. Cornell students have access to all of the libraries and other services of the university.

The school operates in four areas: (1) resident instruction, (2) extension and public service, (3) research, and (4) publications. It provides instruction to undergraduates and graduate students who are preparing for careers in the field, as well as to men and women already engaged in industrial relations activities and the general public through its Extension and Public Service Division.

The school's Conference Center, part of the extension division, initiates and hosts conferences covering the full scope of industrial and labor relations. The center provides continuing education and information to practitioners and scholars.

The Research Division develops materials for resident and extension teaching and originates studies in industrial and labor relations. The Publications Division publishes and distributes the research results.

DEPARTMENTS OF INSTRUCTION

Courses in the school are organized into six departments:

Collective Bargaining, Labor Law, and Labor History

In the study of workers, employers, and the government policies affecting them, members of this faculty concentrate on subjects of industrial and labor relations best understood by reliance on the fields of administration, economics, history, and law. Courses explore subjects within the framework of American society, stress fundamental forces of change, and analyze texts and empirical data with methods drawn from the social sciences, the humanities, and the legal professions.

Economic and Social Statistics

Economic and Social Statistics includes the principles of statistical reasoning, statistical methods, and the application of statistical tools of analysis.

International and Comparative Labor Relations

International and Comparative Labor Relations is concerned with industrial and labor relations systems and labor markets in other parts of the world. Countries include those in Western Europe, as well as the newly industrializing countries in Asia and the Third World.

Labor Economics

Labor Economics deals with labor markets: that is, the institutional arrangements, terms, and conditions under which workers supply their labor and under which firms demand their labor. Faculty members are especially concerned with understanding the workings of labor markets and the effects of various public policies. The topics dealt with in courses and research include the following: analysis of the labor force, employment and unemployment, wages and related terms of employment, income distribution, income security programs, health and safety in industry, retirement, pensions and social security, economic aspects of collective bargaining, and economic demography.

Organizational Behavior

By studying individuals, groups, single organizations, and associations or organizations, persons in the field of Organizational Behavior understand human behavior within organizations as well as the actions of the organizations themselves. At the individual level of analysis, courses consider motivation, leadership, attitudes, personality, group processes, organizational change, and worker participation. At the organizational level, courses examine occupations, deviance in the work place, conflict, power, organizational design, public policy regarding organizations, and industrial conflict. The department also offers courses on research methods in organizational research and general survey courses in both psychological and sociological research.

Personnel and Human Resource Studies

This department offers specialization in personnel management or human resource studies. Personnel management focuses on employer-employee relationships and deals with such topics as human-resource planning, staffing, computer applications to personnel, personnel information systems, training, management development, performance appraisal, compensation administration, organization development, and the sociological environment of personnel management. The study of human resource policy focuses on government efforts to enhance the population's ability to be employed. Although primarily concerned with governmental measures that influence the supply of labor (for example, training, education, health, mobility, and immigration), the subject area also includes policies in private industry that relate to the demands for labor.

A full list of required and elective courses is available from the Office of Student Services, 101 Ives Hall.

RESIDENT INSTRUCTION

This division conducts the on-campus programs leading to the degrees of Bachelor of Science, Master of Industrial and Labor Relations, Master of Science, and Doctor of Philosophy from Cornell.

Office of Student Services

Staff members from the Office of Student Services, 101 Ives Hall, work closely with faculty and faculty committees to administer degree programs for the school and many of the school's support services. The office's responsibilities include the admitting and orienting of new students, maintaining students' personal and academic records, and counseling students on personal and academic problems. The office also works closely with seniors who are planning graduate study.

Counseling and Advising

New students will be provided advising on orientation, academic procedures, and course registration by counselors in the Office of Student Services.

Each of the school's academic departments names faculty members to serve as advisers for students who wish to consult with them regarding career possibilities in the field, postgraduate programs, or similar matters. Questions or issues related to graduation requirements, course registration, and related academic procedures should be raised with counselors in the Office of Student Services.

Minority Programs

Cornell University administers a variety of special opportunity programs designed to provide financial assistance and other forms of assistance to (1) minority students and (2) low-income students meeting program guidelines. The purpose of these programs is to open access to a Cornell education for capable students who otherwise might not secure the admissions consideration, financial assistance, or supportive services necessary for their success at the university. The associate director for minority education in the Office of Student Services provides academic and personal counseling to all ILR minority students. ILR offers a variety of support services to enhance academic achievement. For details, prospective students should contact ILR Admissions.

STUDY OPTIONS

Several study options are open to ILR undergraduates, making it possible to tailor a program to fit special circumstances.

One such option is the five-year ILR master's degree. With early planning, some students may earn the M.S. degree in the fifth year. Using another option, some ILR students arrange for dual registration in the Johnson Graduate School of Management, earning their bachelor's degree in ILR and a master's degree in the Johnson Graduate School of Management after five years of study.

Some students elect to spend a semester in New York City, Albany, or Washington, D.C., with a chance to observe actual labor problem solving as interns in congressional offices, labor organizations, personnel offices, and state and federal agencies. For more information, see "Special Academic Programs," below.

Study abroad options are also available at a number of foreign universities. Qualified students may spend a semester or a full year studying abroad.

A number of ILR courses deal directly with today's problems and involve fieldwork in the Ithaca area and elsewhere in New York State.

The ILR program allows juniors and seniors who want to conduct their own research to receive course credit for individually directed studies if the program is supervised by a faculty member.

Study in Absentia

Registration in absentia enables a student to seek admission in another American institution for a semester or a year and transfer credit toward completion of the Cornell degree. This study option requires the development of a plan of study, a statement of appropriate reasons for study away from the university (e.g., availability of courses not offered at Cornell), good academic standing, approval of the plan by the director of student services, and payment of a special in absentia registration fee. Course work taken in absentia is usually not evaluated for transfer credit until the work has been completed and the student has returned to the school. Students then submit a course syllabus and other evidence of content to the chairman of the department that might have offered the respective course, or to a counselor in the Office of Student Services if the course is more appropriate as a general elective.

Leave of Absence or Withdrawal

If a student desires to withdraw or to take a leave of absence from the university, an interview should be scheduled with a counselor in the Office of Student Services. Counselors will assist students in petitioning for approval of a leave of absence and in contacting the appropriate offices or departments of the university.

REQUIREMENTS FOR GRADUATION

To earn the Cornell Bachelor of Science degree in industrial and labor relations, the student needs to successfully complete 120 credits. This requires eight terms for an average of 30 credits a year although some students accelerate their studies.

Required Courses

(55 credits)

The curriculum prescribes the courses and subjects listed in the table below, to be taken in the terms indicated during the freshman, sophomore, and junior years. In the senior year, all courses will be electives.

Course or Subject	Credits	Term
Freshman Year		
Freshman Seminars*	6	Fall and spring
Econ 101–102, Micro-Macroeconomics*	6	Fall and spring
Psych 101, Introduction to Psychology*	3	Fall
ILRCB 100, United States Labor History in the Nineteenth Century	3	Fall
ILROB 120, Macro Organizational Behavior and Analysis	3	Fall
ILRST 210, Statistics I	4	Spring
Any two of the following:	6	Spring
ILRCB 101, United States Labor History in the Twentieth Century		
ILRLE 140, Development of Economic Institutions		
ILROB 121, Micro Organizational Behavior and Analysis		
Physical education	0	Fall and spring
Sophomore Year		
ILRCB 201, Labor Relations Law and Legislation	3	Fall
ILRLE 240, Economics of Wages and Employment	3	Fall
ILRST 211, Statistics II	3	Fall
ILRPR 260, Personnel Management	3	Fall or spring
ILRCB 200, Collective Bargaining	3	Spring
Ag Econ 221, Financial Accounting	3	Spring
ILRCB 101 or ILRLE 140 or ILROB 121	3	Spring
Junior Year		
ILRLE 340, Economic Security	3	Fall or spring

*College of Arts and Sciences

Elective Courses

(65 credits)

From the courses offered by the school, students must select a minimum of 27 credits of ILR elective courses. No more than 9 of these credits may be satisfied by ILR 499, Directed Studies, or ILR 497–498, Internships, or ILR 495, Honors Program.

Undergraduates are required to select one course in the humanities and one intensive writing course (each for a minimum of three credits) from a list of designated courses to be completed during the sophomore, junior, or senior years.

The remaining 33 credits may be selected from the courses of any other college at Cornell, but a student who takes more than 33 credits in the endowed colleges (the College of Architecture, Art, and Planning; the College of Arts and Sciences; the Johnson Graduate School of Management; the College of Engineering; and the School of Hotel Administration) will be billed for the additional tuition at the current cost per credit.

The number of credits that may be taken in the endowed colleges at no additional cost to the student may be changed at any time by official action of the school.

SCHEDULING AND ATTENDANCE

Schedule Changes

Occasionally it may be necessary for a student to request changes in his or her course schedule either before a term begins or during the semester. Such requests must be directed to the Office of Student Services to avoid possible loss of academic credit.

Class Attendance

It is each student's responsibility to attend all scheduled classes unless approved excuses have been given by the faculty. In some courses an instructor may permit a maximum number of class absences without a grade penalty or dismissal from the course. An explanation for absence from class may occasionally be secured from the Office of Student Services in advance of the expected absence. An approved absence may be warranted by:

1) participation in authorized university activities such as athletic events, dramatic productions, or debates;
2) medical problems supported by a record of clinic or infirmary treatment;
3) serious illness or death in the immediate family;
4) other circumstances beyond the student's control.

A request for explanation of an absence should, when possible, be made to the Office of Student Services before the date of expected absence. A reported and explained absence does not relieve a student from fulfillment of academic requirements during the period of absence. The course instructor has the authority to determine what work must be completed. The office can only confirm the explanation for absence. Students should inform the Office of Student Services of any problems they have meeting course requirements.

ACADEMIC STANDING AND GRADES

Academic Integrity

In 1987 the faculty of the School of Industrial and Labor Relations approved a revised code of academic integrity. This code, while based on the Cornell University code, varies somewhat.

Absolute integrity is expected of all Cornell students in all academic undertakings. They must in no way misrepresent their work, fraudulently or unfairly advance their academic status, or be a party to another student's failure to maintain academic integrity. The code specifically prohibits:

1) knowingly representing the work of others as one's own;
2) using or obtaining unauthorized assistance in any academic work;
3) fabricating data in laboratory or field work;
4) giving fraudulent assistance to others;
5) fabricating data in support of laboratory or field work.

Full details on the applications of those prohibitions to course work, term papers, examinations, and other situations are listed in the code. Copies are available from the Office of Student Services, 101 Ives Hall.

Dean's List

A Dean's List is compiled for each of the four undergraduate classes each term on the seventh day following receipt of final grades from the registrar. Eligibility for the Dean's List is determined by applying all of the following criteria:

1) achievement of a term average for freshmen of 3.3 or better; for sophomores of 3.4 or better; and for juniors and seniors of 3.6 or better;
2) a minimum course load for the term of 12 letter-graded credits;
3) completion of all courses registered for at the beginning of the term;
4) satisfaction of all good-standing requirements.

Academic Standing

Good standing requires that all of the following criteria be met at the end of each term:

1) an average of C– (1.7) for the semester's work, including a minimum of 8 completed and letter-graded credits;
2) no failing grades in any course, including physical education;
3) a cumulative average of C– (1.7) for all completed terms.

If at the end of any term a student fails to maintain good standing or if overall academic performance is so marginal as to endanger the possibility of meeting school and university degree requirements, his or her record is reviewed by the Committee on Academic Standards and Scholarships. The committee may issue a written warning to the student at that time. If a student does not improve after the written warning, he or she may be denied permission to register for the next term.

Involuntary Separation from the School for Academic Reasons

A student may be denied permission to reregister at the end of any term when he or she has failed:

1) to establish good standing after a semester on warning;
2) to maintain an average of 1.7 in any term after a previous record of warning;
3) to achieve good standing after being on warning any two previous semesters;
4) two or more courses in one term or has a term average of 1.0 or below.

The Academic Standards and Scholarship Committee may decide to permit a student to remain on warning more than one semester if there has been significant improvement even though the cumulative average is still below 1.7.

S-U Grading Policy

An undergraduate may register to receive a final grade of S (Satisfactory) or U (Unsatisfactory) in courses that offer this option—either in the school or in other divisions of the university—subject to the following conditions:

1) the S-U option may be used in ILR and in out-of-college course electives only, not in directed studies;
2) students are limited to registering in two S-U courses a term;
3) S-U registration is limited to 4 credits for each course;
4) students registering for S-U grades must be in good standing;
5) students must fulfill the graduation requirement of 105 letter-graded credits.

ILR faculty members assign a grade of U for any grade below C– and a grade of S for any grade of C– or better. A grade of U is considered equal to an F in determining a student's academic standing, although it is not included in the cumulative average.

No change of grading (from letter to S-U or from S-U to letter) may be made after the first three weeks of class. There are no exceptions to this restriction, and appeals will not be accepted.

Grades of Incomplete

A grade of incomplete is assigned when the course has not been completed for reasons that are acceptable to the instructor. It is understood that the work may be completed later and credit given. Instructors may grant a grade of incomplete for a limited number of clearly valid reasons, but only to students with substantial equity in a course. A firm and definite agreement on the conditions under which it may be made up must be made with the instructor. The school's policy allows a maximum of two full terms of residence for removal of a grade of incomplete. If it is not made up within this time, the grade automatically becomes an F.

SPECIAL ACADEMIC PROGRAMS

To meet the special academic objectives of some students, the school's faculty has established several special academic programs. For additional information, students should contact a counselor in the Office of Student Services. Counselors will explore the program with students to help them decide if it suits their interests.

Dual Registration in the Johnson Graduate School of Management

Dual informal registration in the Johnson Graduate School of Management leads to a Bachelor of Science degree in industrial and labor relations and a master's degree in management after five years of study and is open to students who meet the requirements of the Johnson Graduate School of Management.

Early planning by each student, preferably in the sophomore year, is desirable to ensure that the expectations of the Johnson Graduate School of Management and ILR curriculum requirements are fulfilled. Students interested in the very limited and selective program of the Johnson Graduate School of Management should contact the Admissions Office, 319 Malott Hall, and a counselor at the Office of Student Services.

Five-Year Master of Science Degree Program

With early planning it is possible to earn the M.S. degree in a fifth year of study. This program is designed specifically for those who wish concentrated study in an area of specialization in the school for a Master of Science degree. Students considering this program should consult a counselor in the Office of Student Services after their freshman year.

Internships

The Credit Internship Program has provided students with a vivid understanding of problems in labor and industrial relations through observation and participation in "real-life" labor problem solving. A number of selected students spend a term of the junior year in Albany, New York City, or Washington, D.C., in close contact with practitioners. Their activities include independent research under direction of ILR faculty members and seminars drawing on fieldwork experience with employers, labor organizations, and government agencies. More information about this program is available from the Office of Student Services.

Honors Program

Undergraduates who are ranked in the top 20 percent of their class at the end of the junior year may propose a two-semester research project, an honors thesis, for review by the Committee on Academic Standards and Scholarships. When approved, the candidate for graduation with honors works for two semesters (for 3 credits in each term) to research, write, and then defend the thesis.

Study Abroad

Cornell students with strong academic records and the necessary preparation in required and elective courses are encouraged to consider study abroad. The university currently has agreements with universities in Germany, Israel, England, and the Scandinavian countries that permit undergraduates to register for courses while maintaining Cornell registration and financial aid for a semester or a year. Information about those opportunities may be requested from Cornell Abroad, in the Center for International Studies, 130 Uris Hall.

Some study abroad programs require the development of language proficiency and preparation in appropriate courses at Cornell. Students should consult the Office of Student Services and Cornell Abroad in the freshman and sophomore years to be sure that they comply with the academic and procedural requirements for study abroad.

COLLECTIVE BARGAINING, LABOR LAW, AND LABOR HISTORY

C. Daniel, chair; G. Brooks, T. Crivens, D. Cullen, I. DeVault, M. Gold, L. Gray, J. Gross, H. Katz, G. Korman, R. Lieberwitz, S. Kuruvilla, D. Lipsky, P. Ross, N. Salvatore, R. Seeber, L. Turner, J. Windmuller

ILRCB 100 Introduction to U.S. Labor History: Nineteenth Century
Fall. 3 credits.
C. Daniel, I. DeVault, G. Korman, N. Salvatore.
This first semster of a two-semester sequence covers the major changes in the nature of work, the workforce, and the institutions involved in industrial relations in the United States through the end of the nineteenth century.

ILRCB 101 Introduction to U.S. Labor History: The Twentieth Century
Spring. 3 credits.
C. Daniel, I. DeVault, G. Korman, N. Salvatore.
This second semester of a two-semester sequence covers the major changes in the nature of work, the workforce, and the institutions involved in industrial relations in the United States from the end of the nineteenth century up to the present.

ILRCB 200 Collective Bargaining
Fall or spring. 3 credits.
H. Katz, S. Kuruvilla, L. Turner.
A comprehensive introduction to industrial relations and collective bargaining in the United States; the negotiation, scope, and day-to-day administration of contracts; the major substantive issues in bargaining, including their implication for public policy; industrial conflict; the major challenges facing unions and employers today; U.S. industrial relations in international and comparative perspective.

ILRCB 201 Labor and Employment Law
Fall, spring, or summer. 3 credits.
T. Crivens, M. Gold, J. Gross, R. Lieberwitz.
A survey of the laws that govern the employment relationship. Topics include the law of organizing and collective bargaining, employment discrimination, internal union democracy, occupational safety and health, workers' compensation, unemployment compensation, minimum wages, and employment at will. Also serves as an introduction to judicial and administrative systems.

ILRCB 301 Labor Union Administration
Fall. 3 credits. Prerequisites: ILRCB 100 and 201.
G. Brooks.
Study and analysis of the structure and operations of American unions, including the complicated internal life of the organizations: the varied environments in which unions develop and grow or decline; the relationship of national unions, local unions, and members in the many different aspects of internal union government; the ways in which unions are set up to handle organizing, collective bargaining, contract administration, and political activity; and the widespread movement toward merger and consolidation of unions that began in the sixties and continues today. All of these will involve a study of union constitutions and other primary documents, in addition to secondary readings. Attention will be given to relevant legislation, current problems of unions, and the eternal problems of attaining union democracy.

ILRCB 303 Research Seminar in the Social History of American Workers
Fall or spring. 4 credits. Limited to upperclass students who have demonstrated their ability to undertake independent work and who have received permission of the instructor.
G. Korman.
An examination of a different subject each year.

ILRCB 304 Seminar in the History, Administration, and Theories of Industrial Relations in the United States
Fall or spring. 4 credits. Prerequisite: permission of instructor.
C. Daniel, I. DeVault, G. Korman, N. Salvatore.
Designed to explore the social, economic and political background of industrial relations in the history of the United States. Examines a different subject each year.

ILRCB 305 Labor in Industrializing America: 1865–1920
Fall. 3 credits. Prerequisites: ILRCB 100 and 101.
N. Salvatore.
Examines the experience of working people in the years between the Civil War and World War I. It will explore both the workers themselves—their organization, diverse cultures, ethnic and racial traditions, and political activities—and the dramatic changes in industry that restructured American life during this period.

ILRCB 381 Jewish Workers in Europe and America, 1835–1948
Fall or spring. 4 credits. Open to sophomores, juniors, and seniors.
G. Korman.
This course in comparative history examines the complex experiences of the Yiddish-speaking immigrant workers and their families. A special subject of interest is the extraordinary history of the Jewish working classes between 1924 and 1948.

ILRCB 384 Women and Unions
Fall or spring. 4 credits.
I. DeVault.
Will explore women's participation in the United States labor movement in the nineteenth and twentieth centuries. Issues covered will include women workers' relations with male-dominated union movements, the role of cross-class alliances of women in organizing women workers, interactions with radical parties and organizations, problems faced by women union leaders and activities, and others.

ILRCB 385 The African-American Workers, 1865–1910: The Rural and Urban Experience
Spring. 3 credits. Prerequisites: juniors and seniors or permission of instructor.
N. Salvatore.
Examines the history of blacks in America from Emancipation through the experience of the first generation born after slavery, with a focus on the work experience. Topics will include the restructuring of work during Reconstruction; the relationship between work and black organizational developments; between black and white workers; and the nature of work in the agricultural south and in cities throughout the nation.

ILRCB 386 The African-American Worker, 1910–the present: Race, Work and the City
Fall. 3 credits. Prerequisites: juniors and seniors.
N. Salvatore.
Examines the history of blacks in America from the start of the Great Migration through the 1970s, with a focus on the work experience. Topics will include the effect of migration and urbanization on black workers; the nature of the relationship between black and white workers as influenced by depression and two world wars; and an examination of the effect of the Civil Rights movement on the economic circumstances of black workers.

ILRCB 400 Union Organizing
Spring, weeks 1–7. 2 credits.
2 meetings each week. Staff.
This course explores various aspects of unions' attempts to organize workers: why some workers join unions and others do not; the techniques used by both unions and employers during organizing campaigns; and the present law of organizing and proposed amendments to that law. Includes an examination.

ILRCB 403 The Law of Workers' Compensation
Fall, weeks 1–7. 2 credits. Prerequisite: ILRCB 201/501 or permission of instructor.
Staff.
A survey of legal aspects of workers' compensation, the program that provides cash benefits, medical care, and rehabilitation services to workers disabled by work-related injuries and diseases.

ILRCB 404 Contract Administration
Fall, weeks 1–7. 2 credits. Prerequisites: undergraduates, ILRCB 200 and 201; graduate students, ILRCB 500 and 501.
Staff.
This course bridges the gap between ILRCB 200 (500), Collective Bargaining, and ILRCB

602, Arbitration. It focuses on various aspects of dispute settlement process prior to final resolution. The intent of the course is to expand the knowledge of students rather than to develop personal skills. It includes such topics as (1) the historical development of contractual grievance process, (2) the merits of various alternative processes that have been adopted by unions and managements in the United States, (3) the impact of external law on the behavior of the parties in the adjustment process, (4) a comparison of the U. S. system with systems in other industrialized economies, (5) current issues and problems in the systems, (6) nonunion grievance processes, and (7) ongoing experimental alternatives to the standard systems.

ILRCB 406 History of the Black Worker in the United States
Fall. 3 credits. Prerequisite: ILRCB 100.
J. Gross.
Intended to introduce the student to the history of the black worker in the United States through a review and analysis of the existing literature of black labor history and through source documents from the National Archives. Discussions will center around the black worker in agriculture, industry, and government; black worker migrations; black workers and organized labor; and black workers, discrimination, and the law.

ILRCB 407 Contemporary Trade Union Movement
Fall. 3 credits. Prerequisites: ILRCB 100, 101, and 502, upperclass standing.
C. Daniel, N. Salvatore.
An examination of contemporary trade union issues in the context of labor's history since World War II. Among the issues to be discussed are centralization of union power, union democracy, political action, and strategies of collective bargaining. A series of speakers from the union movement will address the class. Midterm, final, and term paper are required.

ILRCB 482 Ethics at Work
Fall or spring. 3 credits.
M. Gold.
Major theories of ethics are used to examine a number of ethical issues in the employment relationship, including genetic screening of job applicants, random drug testing of employees, affirmative action, discipline for off-duty conduct, whistle-blowing, worker safety and cost/benefit analysis, comparable worth, strikes by employees providing crucial services, and crossing a picket line.

ILRCB 484 Employment Discrimination and the Law
Fall. 4 credits. Prerequisite: ILRCB 201/501 or equivalent.
T. Crivens, M. Gold.
An examination of legal problems involving employment discrimination based on race, color, religion, sex, national origin, or age. The impact of developing principles of law on preemployment inquiries and testing, seniority and promotions, and other personnel policies, practices, and procedures are discussed. The requirements of affirmative action under Executive Order 11246, as amended, are analyzed. Special attention is given to the role of state law in resolving employment discrimination claims and the procedural framework for raising and adjudicating such claims before administrative agencies and the courts.

ILRCB 485 The Law of Occupational Safety and Health
Fall, weeks 7–14. 2 credits. Prerequisite: ILRCB 201/501 or permission of instructor.
Staff.
Primary concern is legal developments concerning the Occupational Safety and Health Act of 1970. Limited attention to related legal issues such as arbitration of safety and health issues.

ILRCB 488 Liberty and Justice for All
Fall. 3 credits. Limited to 16 students.
M. Gold.
An examination of contemporary issues from the perspectives of philosophy, law, and the social sciences. Topics will be selected from among the following: affirmative action and reverse discrimination, the right to life (from abortion to capital punishment), comparable worth, and constitutional rights such as freedom of speech.

ILRCB 495 Honors Program
Fall and spring (yearlong course). 3 credits each term. Admission to the ILR senior honors program may be obtained under the following circumstances: (a) students must be in the upper 20 percent of their class at the end of their junior year; (b) an honors project, entailing research leading to completion of a thesis, must be proposed to an ILR faculty member who agrees to act as thesis supervisor; and (c) the project, endorsed by the proposed faculty sponsor, is submitted to the Committee on Academic Standards and Scholarships.
Accepted students embark on a two-semester sequence. The first semester consists of determining a research design, familiarization with germane scholarly literature, and preliminary data collection. The second semester involves completion of the data collection and preparation of the honors thesis. At the end of the second semester, the candidate is examined orally on the completed thesis by a committee consisting of the thesis supervisor, a second faculty member designated by the appropriate department chair, and a representative of the Academic Standards and Scholarship Committee.

ILRCB 497–498 Internship
Fall or spring. 497, 3 credits; 498, 6 credits.
Staff.
All requests for permission to register for an internship must be approved by the faculty member who will supervise the project and the chairman of the faculty member's academic department before submission for approval by the Committee on Academic Standards and Scholarship. Upon approval of the internship, the Office of Student Services will register each student for 497, for 3 credits graded A+ to F for individual research, and for 498, for 6 credits graded S-U, for completion of a professionally appropriate learning experience, which is graded by the faculty sponsor.

ILRCB 499 Directed Studies
Fall or spring. 3 credits.
For individual research, conducted under the direction of a member of the faculty, in a special area of labor relations not covered by regular course offerings. Registration is normally limited to seniors who have demonstrated ability to undertake independent work. Eligible students should consult a counselor in the Office of Student Services at the time of course registration to arrange for formal submission of their projects for approval by the Academic Standards and Scholarship Committee.

ILRCB 500 Collective Bargaining
Fall or spring. 3 credits. Open only to graduate students. Recommended: ILRCB 501 taken previously or concurrently.
H. Katz, S. Kuruvilla, L. Turner.
A comprehensive study of collective bargaining, with special emphasis on philosophy, structures, process of negotiations, and administration of agreements. Attention is also given to problems of handling and settling industrial controversy, the various substantive issues, and important developments and trends in collective bargaining.

ILRCB 501 Labor and Employment Law
Fall, spring, or summer. 3 credits.
T. Crivens, M. Gold, R. Lieberwitz.
A survey and analysis of the law governing labor relations and employee rights at the workplace. The first half of the course examines the legal framework within which collective bargaining takes place, including union organizational campaigns, negotiations for and enforcement of collective bargaining agreements, and the use of economic pressure. The second half of the course surveys additional issues of rights in employment, including such topics as employment discrimination, the developing law of "unjust dismissal," and union democracy.

ILRCB 502 History of Industrial Relations in the United States since 1865
Spring. 3 credits.
C. Daniel, I. DeVault, G. Korman, N. Salvatore.
This introductory survey course emphasizes historical developments in the twentieth century. Special studies include labor union struggles over organizational alternatives and such other topics as industrial conflicts, working-class life styles, radicalism, welfare capitalism, union democracy, and the expanding authority of the federal government.

ILRCB 600 Advanced Seminar in Labor Arbitration
Spring. 3 credits. Limited to juniors, seniors. and graduate students. Prerequisites: ILRCB 602 or equivalent and permission of instructor.
J. Gross.
An advanced seminar in labor arbitration emphasizing the practical aspects of current labor arbitration techniques and problems. Subjects considered range from laboratory exercises in the presentation of an arbitration case, the preparation of prehearing and posthearing briefs, and the writing of an arbitration opinion and award, to the investigation and evaluation of the experience of labor arbitrators, with selected case problems arising in state and federal employment and public education as well as in the private sector.

ILRCB 601 Labor-Management Negotiations
Spring or fall. 3 credits.
S. Kuruvilla.
Focus of the course is on the theory and practice of labor-management negotiations. Emphasis is on the theories of bargaining, union and management preparations for bargaining, bargaining strategies and tactics, and preparation for arbitration. Students will be exposed to numerous films about negotiations, and will engage in a major collective bargaining simulation that involves a

week of continuous negotiation. Students will also undertake one major arbitration hearing before a professional arbitrator. Grades will be based on performance at bargaining and arbitration.

ILRCB 602 Arbitration
Fall or spring. 4 credits. Limited to 21 students. Prerequisites: undergraduates, ILRCB 200; graduate students, ILRCB 500; permission of instructor.
J. Gross.
A study of the place and function of arbitration in the field of labor-management relations, including an analysis of principles and practices, the law of arbitration, the handling of materials in briefs or oral presentation, the conduct of a mock arbitration hearing, and the preparation of arbitration opinions and post-hearing briefs.

ILRCB 603 Governmental Adjustment of Labor Disputes
Fall or spring. 3 or 4 credits. Prerequisites: undergraduates, ILRCB 200; graduate students, ILRCB 500.
Staff.
An examination of the various governmental techniques for dealing with labor disputes in both the private and public sectors, including mediation, fact-finding arbitration (both voluntary and compulsory), the use of injunctions, and seizure. The course also examines the application of these techniques under the Railway Labor Act, Taft-Hartley Act, and various state acts.

ILRCB 605 Readings in the History of Industrial Relations in the United States
Fall. 3 credits. Limited to seniors and graduate students.
C. Daniel, G. Korman, N. Salvatore.
A seminar covering, intensively, original printed sources and scholarly accounts for different periods in American history.

ILRCB 606 Theories of Industrial Relations Systems
Fall or spring. 3 credits. Limited to seniors and graduate students. Prerequisites: seniors, ILRCB 100, 101, 200; graduate students, ILRCB 500.
H. Katz.
This course will trace the evolution of theory and research on industrial relations. Topics include: theories of the labor movement, institutional models and evidence regarding what unions do, the origins of internal labor markets and their relationship with unionization, models of strikes, empirical assessments of arbitration, research on union decline, and empirical evidence of the impacts of new technology.

ILRCB 607 Values in Law, Economics, and Industrial Relations
Fall or spring. 3 credits.
J. Gross.
An examination of the often hidden values and assumptions that underlie the contemporary U.S. systems of employment law, work and business, and industrial relations. Classroom discussions and student research projects will use novels and short stories (as well as the literature of industrial and labor relations) to focus on issues such as: discrimination; law, economics and the state; work and business; power, conflict and protest; and rights and justice.

ILRCB 608 Special Topics in Collective Bargaining Labor Law, and Legislation
Fall or spring. 3 credits. Prerequisites: undergraduates, ILRCB 201; graduate students, ILRCB 502.
Staff.
The areas of study are determined each semester by the instructor offering the seminar.

ILRCB 609 Law of Workers' Compensation
Fall. 3 or 4 credits. Prerequisite: ILRCB 201/501 or permission of instructor.
Staff.
A survey of legal aspects of workers' compensation, the program that provides cash benefits, medical care, and rehabilitation services to workers disabled by work-related injuries and diseases. Includes a brief introduction to the disability benefits provided by the Social Security program and to negligence suits by injured workers.

ILRCB 650 Service Work and Workers in Historical Perspective
Fall or spring. 3 credits.
I. DeVault.
This course takes a historical perspective on the development of a service economy in the United States. Readings will include general and theoretical works, but the main focus will be recent historical scholarship on specific occupations and situations in the "nonproductive" workforce. Students will explore primary sources for research on the subject and write research papers.

ILRCB 651 Industrial Relations in Transition
Spring. 3 credits. Limited to seniors and graduate students.
H. Katz.
Considers whether recent developments such as concession bargaining, worker participation programs, and the growth of nonunion firms represent a fundamental transformation in industrial relations practice. Will review recent research and new theories arguing that such a transformation is occurring, including the work of Piore and Sabel, Bluestone and Harrison, and Kochan, McKersie, and Katz. Will also review the counterarguments and evidence put forth by those who believe no such transformation is under way. Course material will focus on industrial relations practice in the private sector in the United States, although some attention will be paid to developments in Western Europe, the United Kingdom, and Japan.

ILRCB 655 Employment Law
Spring. 3 credits. Prerequisites: ILRCB 201/501.
M. Gold.
This course will examine a number of major federal and state laws designed to protect workers in their employment relationships. The historical and theoretical rationales; the major statutory, judicial, and administrative developments; and evidence of the effectiveness of each law will be examined. Where pertinent, consideration will also be given to current controversies surrounding the laws. The material covered will be selected from the following: the Fair Labor Standards Act, unemployment insurance, workers' compensation, the Occupational Safety and Health Act, the Employee Retirement Income Security Act, the doctrine of employment at will, Social Security, workers' right-to-know, plant closings, and protection of workers' privacy.

ILRCB 680 Problems in Union Democracy
Fall or spring. 3 credits.
M. Gold.
Unions are considered as an example of private government, and union democracy is examined by standards and customary practices in both public and private governments. Included are such elements as elections; self-government by majority; rights of minorities; the judicial process, including impartial review; local-national relationships; constituency and representation; the legislative process; and executive power and functions. The regulation of private government by the state will be considered.

ILRCB 681 Selected Topics in Labor and Employment Law
Fall or spring. 3 credits. Prerequisite: ILRCB 201/501 or equivalent.
M. Gold, R. Lieberwitz.
A survey of the law of employment discrimination, internal union democracy, public sector labor relations, and individual rights in the workplace such as privacy, free speech, and due process. Topics covered may vary with the instructor.

ILRCB 682 Seminar in Labor Relations Law and Legislation
Fall or spring. 3 credits. Limited enrollment. Prerequisite: permission of instructor.
R. Lieberwitz.
Legal problems in public employment and other areas of labor relations affecting the public interest.

ILRCB 683 Research Seminar in the History of Industrial Relations
Fall or spring. 3 credits. Prerequisites: undergraduates, ILRCB 100 and 101; graduate students, ILRCB 502.
G. Brooks, C. Daniel, I. DeVault, G. Korman, N. Salvatore.
The areas of study are determined each semester by the instructor offering the seminar.

ILRCB 685 Research Seminar on Trade Unions
Fall or spring. 3 credits. Prerequisite: ILRCB 200 or 500; permission of instructor.
S. Kuruvilla.
This course is designed to provide an analytical survey of research on trade unions in the United States. Major topics include unions in politics, unions as complex organizations, public opinion and attitudes toward unions, determinants of union growth and decline, economic and non-economic effects of unions, internal union government, and commitment and participation in trade union activity. This is a research-oriented course.

ILRCB 686 Collective Bargaining in the Public Sector
Fall or spring. 3 credits. Prerequisites: undergraduates, ILRCB 200 and 201; graduate students, ILRCB 500 and 501.
Staff.
An examination of the development, practice, and extent of collective bargaining between federal, state, and local governments and their employees. The variety of legislative approaches to such matters as representation rights, unfair practices, scope of bargaining, impasse procedures, and the strike against government are considered along with implications of collective bargaining for public policy and its formulation.

ILRCB 687 Current Issues in Collective Bargaining
Fall or spring. 3 or 4 credits. Limited to 25 students. Prerequisites: ILRCB 200/500, and permission of instructor.
Staff.
An intensive study of the most significant current issues and problems facing employers and unions in their relations with each other, with particular emphasis on the substantive matters in contract negotiations and administration of the provisions of collective bargaining agreements. A major research paper is usually required.

ILRCB 689 Constitutional Aspects of Labor Law
Spring. 3 credits.
R. Lieberwitz.
In-depth analysis of the Supreme Court decisions that interpret the United States Constitution as it applies in the workplace. This study will focus on the First Amendment, Fifth Amendment, Fourteenth Amendment, and Commerce Clause, with issues including freedom of speech and association, equal protection, due process, and other issues in the area of political and civil rights. The course entails a high level of student participation in class discussion, and assignments include a research paper.

ILRCB 703 Theory and Research in Collective Bargaining
Spring. 3 credits. Open to graduate students who have had ILRCB 500 and ILROB 723 or their equivalents. Recommended: a statistics course beyond the level of ILRST 510.
Staff.
This is a second-level course in collective bargaining that builds on the institutional research covered in ILRCB 500. The existing literature in the area of collective bargaining is appraised for its theoretical and empirical content. Efforts are made to explore the appropriate role for theory and empirical analysis in moving research in collective bargaining toward a more analytical perspective and to identify and appraise the underlying paradigms used to study collective bargaining-related issues.

ILRCB 705 The Economics of Collective Bargaining
Spring. 3 credits. Prerequisites: ILRCB 500; ILRLE 540 (or their equivalents) and an understanding of multiple regression analysis; or permission of instructor.
Staff.
Focuses on both the economic analysis of unions and collective bargaining in our economy and on the economic forces that affect collective bargaining. The method is to identify and conceptualize the structural determinants of relative bargaining power. On this basis, the course examines both the economic outcomes of collective bargaining and current bargaining trends in a variety of industries. Tentative theoretical analyses of unionism (neoclassical, institutionalist) are compared. The statistical techniques and empirical results of research on the union effect on economic outcomes (wages, prices, inflation, profits, productibility, earnings inequality) are also evaluated. The effect of technology, corporate structures, and public policy on union bargaining power is outlined, and a number of case studies of collective bargaining in the private sector are reviewed. A term paper is required.

ILRCB 784 Employment Discrimination and the Law
Fall. 4 credits. Prerequisite: ILRCB 501 or equivalent.
T. Crivens, M. Gold.
An examination of legal problems involving employment discrimination based on race, color, religion, sex, national origin, or age. The impact of developing principles of law on preemployment inquiries and testing, seniority and promotions and other personnel policies, and practices and procedures are discussed. The requirements of affirmative action under Executive Order 11246, as amended, are analyzed. Special attention is given to the role of state law in resolving employment discrimination claims and the procedural framework for raising and adjudicating such claims before administrative agencies and the courts.

ILRCB 798 Internship
Fall or spring. 1–3 credits.
Designed to grant credit for individual research under direction of a faculty member by graduate students who have been selected for an internship. All requests for permission to register for ILRCB 798 must be approved by the faculty member who will supervise the project.

ILRCB 799 Directed Studies
Fall or spring. Credit to be arranged.
For individual research conducted under the direction of a member of the faculty.

ILRCB 980 Workshop in Collective Bargaining, Labor Law, and Labor History
Fall and spring. 2 credits. Limited to M.S. and Ph.D. candidates in the department. S-U grades only.
Staff.
This workshop is designed to provide a forum for the presentation of current research being undertaken by faculty members and graduate students in the Department of Collective Bargaining, Labor Law, and Labor History, and by invited guests. All M.S. and Ph.D. candidates in the department who are at work on their theses are strongly urged to enroll. Each student in the course will be expected to make at least one presentation during the year, focusing on the formulation, design, execution, and results of that student's thesis research.

ECONOMIC AND SOCIAL STATISTICS

P. Velleman, chair; J. Bunge, A. Hadi, P. McCarthy, M. Wells.

ILRST 210 Statistical Reasoning I
Fall or spring. 4 credits. Not open to engineering or graduate students. Attendance at the first discussion section of the term is essential.
An introduction to the basic concepts of statistics: measures of location and dispersion, estimation and confidence intervals, hypothesis tests, regression and correlation. Students are taught to use a computer at the beginning of the term and use it for weekly assignments.

ILRST 211 Statistical Reasoning II
Fall or spring. 3 credits. Prerequisite: ILRST 210 or suitable introductory statistics course. Attendance at the first discussion section of the term is essential.
A continuation of ILRST 210. Application of statistical techniques to the social sciences. Topics include statistical inference, review of simple regression, multiple regression and correlation, applications of regression, elements of time series analysis, and the design of sample surveys. A computer is used throughout the course. (Students who have taken an introductory course in statistics without a computer will be expected to obtain brief instruction during the first few weeks of the semester.)

ILRST 310 Design of Sample Surveys
Fall. 3 credits. Prerequisite: two terms of statistics.
P. McCarthy.
Application of statistical methods to the sampling of human populations. A thorough treatment of the concepts and problems of sample design with respect to cost, procedures of estimation, and measurement of sampling error. Analysis of nonsampling errors and their effects on survey results (for example, interviewer bias and response error). Illustrative materials are drawn from such fields as market research and attitude and opinion research.

ILRST 312 Applied Regression Methods
Spring. 3 credits. Prerequisite: ILRST 211 or equivalent.
A. Hadi.
The course starts with a review of those parts of matrix algebra that provide the vocabulary and skill necessary to construct and manipulate linear regression models. The standard least-squares theory is then developed, and regression analysis techniques are applied to problems arising in economics, industry, government, and the social sciences. Computer packages are used as an aid to obtain problem solutions. Additional topics are deviation from assumptions, multicollinearity, variable selection methods, and analysis of variance.

[ILRST 313 Graphical Methods for Data Analysis
Fall. 3 credits. Prerequisite: ILRST 211 or equivalent. Not offered 1992–93.
Staff.
Classical and recently developed graphical methods for analysis and display. Characteristics of effective and honest graphs with comparison of alternative methods for understanding data. Includes study of current computer programs and methods expected to be practical in the near future: graphing of univariate data, bivariate plots, multivariate data, graphical methods of data analysis; the specification, modification, and control of graphs; study of interaction between choice of display and underlying patterns.]

ILRST 410 Techniques of Multivariate Analysis
Fall. 3 credits. Prerequisite: two statistics courses or permission of instructor.
Staff.
The techniques of multivariate statistical analysis, the associated assumptions, the rationale for choices among techniques, and illustrative applications. Some matrix algebra and related mathematics are introduced. Includes some regression; correlation; principle components; multivariate tests on means, variances, and covariances; relations between sets of variates; and discriminatory analysis.

ILRST 411 Statistical Analysis of Qualitative Data
Spring. 3 credits. Prerequisite: two statistics courses or permission of instructor.
Staff.
An advanced undergraduate and beginning graduate course. Includes treatment of association between qualitative variates, rank-order methods, and other nonparametric statistical techniques, including those related to chi-squared.

ILRST 499 Directed Studies
For description, see the section on Collective Bargaining, Labor Law, and Labor History.

ILRST 510 Statistical Methods for the Social Sciences I
Fall or spring. 4 credits.
A nonmathematical course for graduate students in the social sciences without previous training in statistical method. Emphasis is on discussion of technical aspects of statistical analysis and on initiative in selecting and applying statistical methods to research problems. The subjects ordinarily covered include analysis of frequency distributions, regression and correlation analysis, and selected topics from the area of statistical inference. Students are taught to use a computer at the beginning of the term and use it for weekly assignments.

ILRST 511 Statistical Methods for the Social Sciences II
Fall or spring. 3 credits. Prerequisite: ILRST 510 or an equivalent introductory statistics course.
This is a second course in statistics for graduate students that emphasizes applications in the social sciences. Topics include review of simple linear regression, multiple regression (theory, model building, model violations), and analysis of variance. Statistical computing packages are used extensively. (Students who have taken an introductory course in statistics without a computer course will be expected to obtain brief instruction during the first few weeks of the semester.)

ILRST 610 Seminar in Modern Data Analysis
Fall. 3 credits. Prerequisite: two statistics courses or permission of instructor.
P. Velleman.
An advanced survey of modern data analysis methods. Topics include exploratory data analysis, robust methods, regression methods, and diagnostics. Extensive outside readings cover recent and historical work. Participants should have some knowledge of multiple regression, including the use of matrices (ILRST 312 may be taken concurrently), and some experience using a computer.

[ILRST 611 Statistical Computing
Spring. 3 credits. Prerequisites: Linear algebra, knowledge of a programming language, and statistics at least through multiple regression. Not offered 1992–93.
P. Velleman, M. Wells.
A survey of new aspects of statistical computing using the recent book on the subject by Ronald Thisted. Includes: basic numerical methods, numerical linear algebra, nonlinear statistical methods, numerical integration and approximation, smoothing and density estimation. Additional special topics may include: Monte Carlo methods, statistical graphics, computing-intensive methods, parallel computation, computing environments. Designed for graduate students in the statistical sciences and related fields interested in new advances. Students may be asked to write programs in a programming language of their choice.]

ILRST 612 Statistical Classification Methods
Spring. 3 credits. Prerequisite: knowledge of statistics equivalent to the level of ILRST 312 or permission of instructor.
J. Bunge.
An introduction to a variety of statistical techniques that assign objects to categories on the basis of observed characteristics of the objects. Course topics include but are not limited to: discriminant analysis and its extensions and variations; Classification and Regression Trees (CART); various clustering techniques; and estimation of error of classification methods.

ILRST 613 Bayesian and Conditional Inference
Spring. 3 credits. Prerequisites: Graduate level courses equivalent to OR&IE 670 and OR&IE 651 or permission of instructor.
Staff.
This course covers the following topics: loss functions and utility theory, prior information and subjective probability, coherency, basic Bayesian inference, empirical Bayesian inference, robust Bayesian inference, Bayesian computations, ancillarity, conditional properties of statistical procedures, and Barndorff-Nielsen's exact likelihood theory.

ILRST 711 Sensitivity Analysis in Linear Regression
Fall. 3 credits. Prerequisite: ILRST 312 or equivalent.
A. Hadi.
A course on regression for students in statistical sciences and related fields. Attempts to narrow the gap between the theory and practical application of the linear regression model. Classical and recently developed statistical procedures are discussed. Students will be expected to read articles and thoroughly analyze real-life data sets using computer-packaged programs. Topics include role of variables in a regression equation, regression diagnostics (outliers, leverage points, influential observations, generalized linear models, errors-in-variables, and multicollinearity.

ILRST 712 Theory of Sampling
Fall. 3 credits. Prerequisite: calculus and at least one semester of mathematical statistics.
P. J. McCarthy.
A companion course to ILRST 310, Design of Sample Surveys, stressing the development of the fundamentals of sampling theory. Attention is paid to recent progress in the field. Occasional illustrative material is given to indicate the application of the theory.

[ILRST 713 Empirical Processes with Statistical Applications
Fall. 3 credits. Prerequisite: a course at the technical level of Math 572 and 574 or permission of instructor. Not offered 1992–93.
Staff.
The statistical analysis of life history data is playing an increasing role in the social, natural, and physical sciences. We will formulate and solve various practical problems in the statistical analysis of life history data using the modern theory of stochastic processes. We will examine the martingale dynamics for point processes relevant to life history data. Both parametric and nonparametric inference for multiplicative intensity models will be considered. The large sample properties of the proposed procedures will be discussed in detail using recent extensions of functional central limit theorems for martingales.]

ILRST 799 Directed Studies
For description, see the section on Collective Bargaining, Labor Law, and Labor History.

INTERNATIONAL AND COMPARATIVE LABOR RELATIONS

G. Fields, chair; J. Abowd, J. Bishop, G. Boyer, V. Briggs, I. DeVault, L. Dyer, H. Katz, G. Korman, S. Kuruvilla, V. Pucik, M. Rebick, L. Turner, J. Windmuller

[ILRIC 330 Comparative Industrial Relations Systems: Western Europe
Fall. 3 credits (1 additional credit may be arranged with the instructor). Open to juniors and seniors. Not offered 1992–93.
J. Windmuller.
This course is intended to provide an overview of contemporary industrial relations in several Western European countries, especially Britain, France, West Germany, and Sweden. Particular attention will be given to the role of labor organizations, employers, and government, recent developments in labor relations law and collective bargaining, and current issues in labor-management relations. National industrial relations systems will constitute the principal units of analysis but attempts at comparisons will be made throughout the term.]

ILRIC 331 Comparative Industrial Relations Systems: Non-Western Countries
Spring. 3 credits (1 additional credit may be arranged with the instructor). Open to juniors and seniors.
Staff.
A study of the industrial relations systems of less-developed countries and industrialized non-Western countries, including Japan, the Soviet Union, Yugoslavia, India, and several others. Emphasis is on government labor policies, trade unions, and collective bargaining. Also included is a review of international organizations concerned with labor problems.

[ILRIC 332 Labor in Developing Economies
Spring. 3 credits. Prerequisite: ILRLE 240, Economics 311, or permission of instructor. Not offered 1992–93.
G. Fields.
The economic problems of labor in less-developed nations. Among the subjects included are determinants of income and wage structures in less-developed countries; labor demand and unemployment; labor supply and migration; human resource policy; and development strategy and employment growth.]

ILRIC 333 Western Europe, the United States, and Japan in a Changing World Economy
Fall. 3 credits (1 additional credit may be arranged). Open to juniors and seniors.
L. Turner.
Offers an introduction to the contrasting national trajectories and current political economies of West Germany, Great Britain, France, Sweden, Japan and the U.S. Emphasis will be on (a) cross-national differences and

comparisons; and (b) the different capacities that contrasting institutions offer each society as it grapples with intensifying trade competition, domestic political conflict, and the need for production reorganization and "new industrial relations."

ILRIC 336 The Development of Japanese Labor
Spring. 3 credits.
M. Rebick.
Focuses on the development of the Japanese employment system since World War II (with some reference to prewar developments). Topics covered relate to economic security (employment insurance, pensions, health care, etc.) as well as employment contracts, wage payment systems, education and training systems, union activity and the framework of collective bargaining. Special topics such as interfirm transfers of employees, the rapid growth of temporary labor contracts, problems of population aging, labor market distribution and the recent Equal Employment Opportunity Law will be discussed.

[ILRIR 337 Special Topics:
Fall or spring. 3 or 4 credits. Not offered 1992–93.
Staff.
Devoted to new topics in the field. The specific content and emphasis vary depending upon the interests of the faculty member teaching the course.]

ILRIC 430 History of European Labor Movements
Fall. 3 credits
J. Windmuller.
Examines the development of trade unions in Great Britain, France, and Germany from about 1850 to the present. It emphasizes the emergence and expansion of trade unions, their changing place in industry, politics, and society, and the evolution of public policies for industrial relations through legislative and administrative acts. Comparisons will be made with American developments.

ILRIC 499 Directed Studies
For description, see the section on Collective Bargaining, Labor Law, and Labor History.

[ILRIC 530 Comparative Industrial Relations Systems: Western Europe
Fall. 3 credits. For graduate students. Not offered 1992–93.
J. Windmuller.
Students in this course attend the lectures in ILRIC 330 (see description for ILRIR 330). If enrollment warrants, they will also meet separately at a time to be arranged for discussion of topics in ILRIC 330 and related topics.]

[ILRIC 531 Comparative Industrial Relations Systems: Non-Western Countries
Spring. 3 credits. For graduate students. Not offered 1992–93.
Staff.
Students in this course will attend the lectures in ILRIC 331 (see description for ILRIC 331). If enrollment warrants, they will also meet separately at a time to be arranged for discussion of topics in ILRIC 331 and related topics.]

[ILRIC 532 Labor in Developing Economies
Spring. 3 credits. For graduate students. Not offered 1992–93.
G. Fields.
Students in this course attend the lectures in ILRIC 332 (see description for ILRIC 332). If enrollment warrants, they will also meet separately at a time to be arranged for discussion of topics in ILRIC 332 and additional topics.]

ILRIC 533 Western Europe, the United States, and Japan in a Changing World Economy
Fall. 4 credits. Graduate students.
L. Turner.
See description for ILRIC 333. Graduate students will attend class, take the midterm and submit an analytical research paper at the end of the semester.

ILRIC 536 The Development of Japanese Labor
Spring. 3 credits.
M. Rebick.
See description for ILRIC 336. If enrollment warrants, will meet separately at a time to be arranged for discussion of topics in ILRIC 336 and related topics.

[ILRIC 537 Special Topics:
Fall or spring. 3 or 4 credits. Not offered 1992–93.
Staff.
Devoted to new topics in the field. The specific content and emphasis vary depending upon the interests of the faculty member teaching the course.]

[ILRIC 630 Seminar in International and Comparative Labor Problems
Spring. 3 credits. Not offered 1992–93.
J. Windmuller.
This seminar will be concerned with international aspects of labor organizations and industrial relations. Specific topics will include an examination of international labor movements, the role of the International Labor Organization, the international affairs interests of unions in the United States and other countries, and the labor relations policies of multinational corporations.]

ILRIC 632 European Industrial Relations in Transition
Spring. 4 credits. Graduate seminar open to seniors with permission of instructor only.
L. Turner.
Looks at the labor movements of France, Britain, Sweden, Germany, and Italy in the postwar period. Labor in politics (relations to political parties and to the state) and labor in the workplace (institutions of industrial relations, collective bargaining, shopfloor conflict, codetermination) will be discussed. The emphasis is on cross-national comparisons and on the contrasting capacities of the various labor movements in the face of the dynamic changes and new challenges of today.

ILRIC 633 Labor, Industry and Politics in Germany
Fall. 4 credits. Open to seniors with permission and graduate students.
L. Turner.
Seminar considers the historical role of unions and the Social-Democratic Party in Germany, as well as the position of labor in the West German "postwar settlement." Will study the works councils and codetermination, the rise of a strong postwar labor movement, and the contemporary German version of "democratic corporatism," including the political and industrial participation of labor. Finally, we look at the new challenges for German politics and for German industry and labor posed by unification and the coming of the single European market.

ILRIC 635 Research Seminar on Japanese and Korean Labor Issues
Fall. 4 credits. Open to seniors with permission and graduate students.
M. Rebick.
Topics will be determined mainly by the interests of the participants. Among the topics to be covered this year are population aging, the role of women, regional development, foreign workers, working hours, personnel management in multinationals, and prospects for the labor movement. Some knowledge of either Korean or Japanese is helpful but not essential.

ILRIC 636 Special Topics: Comparative History of Women and Work
Spring. 4 credits.
I. DeVault.
Will explore the similarities and differences between different cultures' assumptions about the work of women as well as women's experiences in varying work circumstances throughout history. Beginning with theoretical pieces and overviews of the history of women and work, most of the course will consist of in-depth examinations of specific work situations or occupations across time and geography. Comparative examples will be taken from the United States, Europe, and the Third World.

ILRIC 637 Labor Relations in Asia and the Pacific Rim
Spring. 3 credits. Permission of instructor required. Seminar format.
S. Kuruvilla.
A comparative survey of the industrial relations systems of selected Asian nations such as Japan, S. Korea, Thailand, Malaysia, Singapore, Hong Kong, China, and several others. The emphasis is on economic development and industrial relations policies in these countries. Industrial relations practices, the extent of union organization, and labor force demographics of these countries will be examined. The primary objective is to provide students with an introduction to industrial relations systems in Asia. The countries chosen are representative, but not exhaustive.

ILRIC 799 Directed Studies
For description, see the section, Collective Bargaining, Labor Law, and Labor History.

ILRCB 303 Research Seminar in the Social History of American Workers
For description, see the section, Collective Bargaining, Labor Law, and Labor History.

ILRCB 381 Jewish Workers in Europe and America, 1835–1948
For description, see the section, Collective Bargaining, Labor Law, and Labor History.

ILRLE 448 Topics in Twentieth-Century Economic History: The Economics of Depression and the Rise of the Managed Economy
For description, see the section, Labor Economics.

ILRLE 640 Economic History of British Labor
For description, see the section, Labor Economics.

ILRLE 641 Postwar Japanese Economy
For description, see the section, Labor Economics.

ILRLE 643 Special Topics in Labor Economics
For description, see the section, Labor Economics.

ILRPR 469 Immigration and the American Labor Force
For description, see the section, Personnel and Human Resource Studies.

ILRPR 656 International Human Resource Management
For description, see the section, Personnel and Human Resource Studies.

ILRPR 698 International Human Resource Policies and Institutions
For description, see the section, Personnel and Human Resource Studies.

ILRPR 760 Seminar in International Human Resource Management
For description, see the section, Personnel and Human Resource Studies.

LABOR ECONOMICS

G. Fields, chair; J. Abowd, G. Boyer, R. Ehrenberg, M. Hanratty, R. Hutchens, G. Jakubson, O. Mitchell, M. Rebick, R. Smith

ILRLE 140 Development of Economic Institutions
Spring. 3 credits. Prerequisite for non-ILR students: permission of instructor.
G. Boyer.
Provides students with an understanding of the historical roots of the economic system currently dominant in Western Europe and the United States. The course will focus on (a) the process of European economic growth prior to 1914, (b) the effect of industrialization on labor in Great Britain, and (c) the historical evolution of economic thought from Adam Smith to J. M. Keynes.

ILRLE 240 Economics of Wages and Employment
Fall, spring, or summer. 3 credits. Prerequisites: Economics 101–102 or equivalent.
Staff.
Analyzes the characteristics and problems of the labor market by applying to them the theory and elementary tools of economics. Behavior on both the demand (employer) and supply (employee) sides of the market is analyzed to gain a deeper understanding of the effects of various government programs targeted at the labor market. Topics covered include education and training, fringe benefits and the structure of compensation, labor-force participation and its relationship to household production, issues regarding occupational choice, an analysis of migration, labor-market discrimination, and the effects of unions.

[ILRIC 332 Labor in Developing Economies
Spring. 3 credits. Not offered 1992–93.
G. Fields.
For description, see the section International and Comparative Labor Relations.]

ILRIC 336 The Development of Japanese Labor
Spring. 3 credits.
M. Rebick.
For description, see the section, International and Comparative Labor Relations.

ILRLE 340 Economic Security
Fall or spring. 3 credits.
M. Hanratty, R. Hutchens.
The economic and social effects of income security measures. Analysis of programs offering protection against economic loss due to industrial accident, temporary and permanent disability, illness, old age, premature death, and unemployment, as well as private efforts to provide security, and the problems of integrating public and private programs. An examination is made of proposals for amending or modifying economic security measures.

[ILRLE 343 Problems in Labor Economics
Fall or spring. 3 or 4 credits. Not offered 1992–93.
Staff.
Devoted to new policy issues and to recent literature in the field. The specific content and emphasis varies in response to the interests of the faculty member teaching the course.]

[ILRLE 344 Comparative Economic Systems: Soviet Russia
Fall. 4 credits. Not offered 1992–93.
A comparative analysis of the principles, structure, and performance of the economy of Soviet Russia. Special attention is devoted to industry and labor.]

ILRLE 345 Corporate Finance and Labor Markets
Spring. 4 credits. Prerequisites: ECON 101, 102 or equivalent, and accounting.
J. Abowd.
The course covers the following topics (with emphasis on labor market applications and implications): (1) the concept of net present value, the valuation of real corporate assets, and the relations between risk and return; (2) capital budgeting decisions and the cost of capital; (3) investment financing decisions and the role of financial markets; (4) capital structure, the Modigliani-Miller propositions, and the relation between debt and equity financing; (5) valuation of corporate debt, options, and other financial assets; and (6) financial planning mergers, and portfolio management. Students must attend the lab.

[ILRLE 348 The Economics of Unemployment
Fall. 4 credits. Prerequisite: ILRLE 240/540 or permission of instructor. Not offered 1992–93.
R. Smith.
This course introduces students to several issues fundamental to an understanding of unemployment: the social costs; definitional questions and measurement problems; the patterns of unemployment; and the various types of unemployment, their causes, and the policies that can or have been pursued to alleviate unemployment. The course is designed for undergraduate and graduate students who have taken a survey course in labor economics or its equivalent.]

ILRLE 441 Income Distribution
Fall. 4 credits. Prerequisite: ILRLE 240 or Economics 313.
R. Hutchens.
Explores income distribution in the United States and the world. Topics to be covered include functional and size distributions of income, wage structure, income-generating functions and theories, discrimination, poverty, public policy and income distribution, and changing income distribution and growth.

ILRLE 442 Economics of Employee Benefits
Spring. 4 credits.
O. Mitchell.
An analysis and appraisal of private health, welfare, and pension plans. Consideration of the origin and development of employer, union, and joint programs and a critical examination of the financing, administration, and general effectiveness of the plans.

[ILRLE 446 Labor Market Discrimination
Fall or spring. 4 credits. Not offered 1992–93.
O. Mitchell.
Examines differences in labor market rewards by gender, race, age, and other worker characteristics from both a theoretical and an empirical perspective. Economic modeling and statistical methodology (including computer analysis) are stressed. Students need some background in microeconomics and data analysis.]

ILRLE 447 Economic Policy Toward the Aging
Fall. 4 credits.
O. Mitchell.
Explores labor market and social policy concerning older workers and retirees. Topics to be covered include labor market trends of the elderly, labor market institutions affecting older people (e. g., mandatory retirement, unemployment, pensions), and government policies, Social Security, health insurance, and retirement income regulation. Cross-national perspectives will be addressed as well.

ILRLE 448 Topics in Twentieth Century Economic History: The Economics of Depression and the Rise of the Managed Economy
Fall. 4 credits. Prerequisites: ILRLE 240 or Economics 314.
G. Boyer.
Topics covered include: the causes of the Great Depression in the United States; the economics of the New Deal; the causes of high unemployment in interwar Great Britain; the rise of Keynesian economics and the development of demand management policies in Great Britain and the United States after 1945.

ILRLE 495 Honors Program
Fall and spring (yearlong course). 3 credits each term.
For description, see the section on Collective Bargaining, Labor Law, and Labor History.

ILRLE 497–498 Internship
Fall or spring. 3 and 6 credits.
For description, see the section on Collective Bargaining, Labor Law, and Labor History.

ILRLE 499 Directed Studies
For description, see the section on Collective Bargaining, Labor Law, and Labor History.

[ILRIC 532 Labor in Developing Economies
Spring. 3 credits. Not offered 1992–93.
G. Fields.
For description, see the section International and Comparative Labor Relations.]

ILRLE 540 Labor Economics
Fall or summer. 3 credits. Prerequisites: Economics 101–102 or equivalent. Required of graduate students majoring or minoring in labor economics and M.I.L.R. candidates.
Staff.
Analyzes the characteristics and problems of the labor market by applying to them the theory and elementary tools of economics.

Behavior on both the demand (employer) and supply (employee) sides of the market is analyzed to gain a deeper understanding of the effects of various government programs targeted at the labor market. Topics covered include education and training, fringe benefits and the structure of compensation, labor-force participation and its relationship to household production, issues regarding occupational choice, an analysis of migration, labor-market discrimination, and the effects of unions.

ILRLE 541 Social Security and Protective Labor Legislation
Spring. 3 credits. Prerequisite: ILRLE 540. Normally required of graduate students majoring or minoring in labor economics and required of M.I.L.R. candidates.
M. Hanratty, R. Hutchens.
The economic and social effects of income security measures. Analysis of programs offering protection against economic loss due to industrial accident, temporary and permanent disability, illness, old age, premature death, and unemployment, as well as private efforts to provide security, and the problems of integrating public and private programs. An examination is made of proposals for amending or modifying economic security measures.

ILRLE 640 Economic History of British Labor 1750–1940
Fall or spring. 4 credits.
G. Boyer.
Will examine various aspects of British labor history from the beginning of the Industrial Revolution until World War II. Specific topics will include: (1) monetary and non-monetary changes in workers' living standards; (2) internal migration and emigration; (3) the London labor market; (4) the extent of poverty and the evolution of the welfare state; (5) Luddism and Chartism; and (6) the development of trade unions.

ILRLE 641 Postwar Japanese Economy
Fall. 4 credits. Open to seniors with permission and graduate students. Suggested prerequisite: Introductory economics *or* general background in Japanese studies (introductory course).
M. Rebick.
Introduction to the Japanese economy since World War II. Analysis of economic growth, financial markets, industrial structure, labor markets, industrial policy, and international trade. General approach will be institutional, describing the Japanese economy as an integral system. Major focus will be the microeconomics of the Japanese firm.

[ILRLE 642 Work and Welfare: Interactions between Cash-Transfer Programs and the Labor Market
Fall. 4 credits. Prerequisite: some familiarity with microeconomics. Not offered 1992–93.
R. Hutchens.
Emphasizes policy issues in analyzing the relationship between the labor market and cash-transfer programs such as social security, public assistance, and unemployment and wages in determining the level and distribution of cash transfers. Investigates the connection between cash transfers and labor supply. Topics include determinants of cash-transfer demand and supply, the negative income tax experiments, and program incentives for withdrawal from the labor force (for example, incentives for early retirement implicit in old-age insurance). A paper on a specific program is required.]

ILRLE 643 Special Topics in Labor Economics
Fall or spring. 3 or 4 credits.
M. Hanratty.
Devoted to new policy issues and to recent literature in the field. The specific content and emphasis vary depending upon the interests of the faculty member teaching the course.

ILRLE 644 The Economics of Occupational Safety and Health
Spring. 4 credits.
R. Smith.
The course analyzes the problem of occupational injuries and illnesses in the United States. The first section concentrates on legal requirements, judicial interpretations, and legal implications of the Occupational Safety and Health Act, then shifts to such questions as the need for, and appropriate goals of, the act; the stringency of safety standards considered in a benefit-cost framework; the difficulties in enforcing the act; and estimates of the impact of the act.

ILRLE 645 Research Seminar on Japanese and Korean Labor Markets
Fall or spring. 4 credits. Open to upper-level undergraduates with permission.
M. Rebick.
This seminar will be concerned with a variety of topics largely determined by the interests of participants. Labor markets and institutions, public policy, demographic issues are among the topics to be covered. Some knowledge of either Korean or Japanese will be helpful.

[ILRLE 647 Evaluation of Social Programs
Fall. 4 credits. Not offered 1992–93.
R. Ehrenberg.
An introduction to the methodologies used by economists to evaluate the impacts of social-action programs and legislation. General evaluation methodology, cost-benefit analysis, and econometrics are discussed. Case studies are considered to illustrate the uses of these techniques, to acquaint the student with major current government programs and legislation, and to estimate these programs' economic impacts. Throughout, the primary analytic framework used by the instructor is microeconomics.]

[ILRLE 648 Economic Analysis of the University
Spring. 4 credits. Not offered 1992–93.
R. Ehrenberg.
This course seeks to illustrate the complexity of decision making in a nonprofit organization and to show how microeconomic analysis in general, and labor market analysis in particular, can be usefully applied to analyze resource allocation decisions at universities. Among the topics covered are financial aid, tuition, admissions policies, endowment policies, faculty salary determination, the tenure system, mandatory retirement policies, merit pay, affirmative action, comparable worth, collective bargaining, resource allocation across and within departments, undergraduate versus graduate education, research costs, libraries, athletics, and "socially responsible" policies. Lectures and discussions of the extensive readings will be supplemented by presentations by Cornell administrators and outside speakers who have been engaged in university resource allocation decisions or have done research on the subject.]

[ILRLE 740 Economic Analysis of Collective Bargaining
Fall. 4 credits. Not offered 1992–93.
J. Abowd.
Examines theoretical and empirical advances in the study of the development of bargaining units and the ongoing relation between organized employees and their employers. It concentrates on economic models that link the performance of the firm and product market to the outcomes of the organizing and bargaining processes. Bargaining unit formation, contract negotiation, strikes, employer investment decisions, employment, profitability and capital valuations are all considered. Detailed statistical analyses that use bargaining unit level information on characteristics of the international, national, and local labor and product markets are part of the course.]

[ILRLE 741 Analysis of Longitudinal Data in the Social Sciences
Spring. 4 credits. Not offered 1992–93.
G. Jakubson.
Considers methods for the analysis of longitudinal data, that is, data in which a set of individual units are followed over time. The focus will be on both estimation and specification testing of these models. The course will consider how these statistical models are linked to underlying theories in the social sciences. Course coverage will include panel data methods (including fixed vs. random effects models for both linear and non-linear systems) and, if time permits, duration analysis.]

ILRLE 742 Economics of Employee Benefits
Spring. 3 credits.
O. Mitchell.
Students in this course attend the lectures in ILRLE 442 (see description for 442). If enrollment warrants, they will also meet separately at a time to be arranged for discussion of topics in 442 and additional topics.

ILRLE 743 Demand and Production Systems: Micro Theory and Econometrics
Fall. 4 credits.
G. Jakubson.
This course covers the implementation of neoclassical models of the demand for commodities (including leisure) by households and the demand for factors of production by firms. It will cover the use of both the primal and dual formulations of the problem to develop empirically testable models of demands by both firms and households. It will then cover the estimation of these demand systems and testing of the theoretical restrictions. The conventional demand systems (including LES, AIDS, etc.) will be analyzed. Attention will be paid to both exact functional forms as well as approximating functions. Additional topics include non/semi-parametric estimation of derivatives, rationing models, and differences between long- and short-run factor demands.

ILRLE 744 Seminar in Labor Economics
Fall. 3 credits. ILRLE 744 and 745 constitute the Ph.D.-level sequence in labor economics.
R. Ehrenberg.
Reading and discussion of selected topics in labor economics. Applications of economic theory and econometrics to the labor market and human resource areas.

ILRLE 745 Seminar in Labor Economics
Spring. 3 credits.
J. Abowd, O. Mitchell.
Reading and discussion of selected topics in labor economics in the fields of theory, institutions, and policy.

ILRLE 746 Labor Market Discrimination
Fall or spring. 4 credits.
O. Mitchell.
Students in this course attend the lectures in ILRLE 446 (see description for ILRLE 446). If enrollment warrants, they will also meet separately at a time to be arranged for discussion of topics in ILRLE 446 and additional topics.

ILRLE 747 Economic Policy toward the Aging
Fall. 4 credits.
O. Mitchell.
Students in this course attend the lectures in ILRLE 447 (see description for 447). If enrollment warrants, they will also meet separately at a time to be arranged for discussion of topics in 447 and additional topics.

ILRLE 748 Models for Limited Dependent Variables
Fall. 4 credits.
G. Jakubson.
This course will cover statistical methods for models in which the dependent variable is not continuous. It covers models for dichotomous response (including probit and logit) and polychotomous response (including ordered response and multinomial logit), various types of censoring and truncation (e.g., the response variable is only observed when it is greater than a threshold), as well as sample selection issues, etc. The course will also include an introduction to duration analysis. The course will cover not only the statistical issues but also the links between behavioral theories in the social sciences and the specification of the statistical model.

ILRLE 798 Internship
For description, see the section on Collective Bargaining, Labor Law, and Labor History.

ILRLE 799 Directed Studies
For description, see the section on Collective Bargaining, Labor Law, and Labor History.

ILRLE 940 Workshop in Labor Economics
Fall or spring. 3 credits. Intended for Ph.D. students who have started to write their dissertations.
Focus is on the formulation, design, and execution of dissertations. Preliminary plans and portions of completed work are presented for discussion.

ORGANIZATIONAL BEHAVIOR

P. Tolbert, chair; S. Bacharach, S. Barley, L. Gruenfeld, T. Hammer, J. Halpern, W. Sonnenstuhl, R. Stern, L. Williams

ILROB 120 Introduction to Macro Organizational Behavior and Analysis
Fall. 3 credits.
Staff.
The relationship between industry and the economy as a whole and its implications for other social institutions in American society (including stratification, politics, and American values) is discussed. The course moves from classical sociological theory to the analysis of complex organizations. The study of industrial organizations and of complex organizations in general, emphasizing authority relations, goals, the division of labor, bureaucracy, and organizational design.

ILROB 121 Introduction to Micro Organizational Behavior and Analysis
Spring or summer. 3 credits.
Staff.
Deals with the relationship between the individual and the organization and such basic psychological processes as need satisfaction, perception, attitude formation, and decision making. The course combines theoretical and hands-on approaches to understanding how the individual perceives, responds to, and alters the organizational environment.

ILROB 320 The Psychology of Industrial Engineering
Fall. 4 credits.
T. Hammer.
A study of the human factors in the industrial engineering of work, workplaces, tools, and machinery. The course examines the aspects of individual and social psychology that operate in the work setting and that should be taken into account in the design of jobs. These include limitations of the human sensory system; individual difference in skills, abilities, motives, and needs; group dynamics; intrinsic motivation; job satisfaction; conflict.

ILROB 323 Introduction to the Study of Attitudes
Fall. 4 credits. Open to juniors and seniors.
Staff.
Designed to acquaint the student with what is known about (1) origins of human attitudes, (2) the determinants of attitude change, and (3) the measurement of attitude differences. Studies employing clinical, experimental, and survey techniques are discussed. Each student designs, executes, and analyzes his or her own research study.

ILROB 324 Work Organizations, Troubled Employees, and Employee Assistance Programs
Spring. 3 credits. Limited to 40 students. Prerequisite: one or more courses in sociology and psychology.
W. Sonnenstuhl.
Focus is on the relationship between organizational life and psychiatric-criminal behaviors. Covers (1) the nature and etiology of psychiatric disorders such as alcoholism, other drug and substance abuse, and the major neuroses; (2) corporate and white-collar criminal behavior; (3) the role of occupational and organizational risk factors in etiology; (4) various types of organizations that represent societal responses to troubled employees—mental hospitals, prisons, jails, halfway houses, shelter workshops, and self-help groups such as Alcoholics Anonymous. Puts differential emphasis on programs within work organizations that attempt to deal with troubled employees, job-based alcoholism, and employee assistance programs. Field format divides class into small groups for application in local relevant organizations. The development, strategies, and management of employee assistance programs will receive special attention.

ILROB 325 Organizations and Social Inequality
Spring. 3 credits. Limited.
P. Tolbert.
Examines the central role that organizations in industrial societies play in allocating income, status, and other resources to individuals. A variety of theoretical explanations of social inequality will be examined, and the social policy implications of each will be considered. Class assignments are designed to develop students' general writing skills, as well as substantive understanding of different theories and approaches to the problem of inequality.

ILROB 326 Sociology of Occupations
Fall or spring. 3 credits. Limited to 45 students. Prerequisite: one or more courses in sociology.
Staff.
Focuses on (1) the societal characteristics of occupations: division of labor, social stratification, mandate and license, occupational ideologies, stories, and tradition; (2) nature and expression of professionalization of occupations; (3) organizational characteristics of occupations: accommodation to formal organizations, occupational associations, and occupational mix; (4) social psychological characteristics of occupations: temperamental and intellectual role demands, occupational attraction, identity, and commitment, and occupational self-images; (5) relationship between occupational structure and organizational structure.

ILROB 327 Psychology of Industrial Conflict
Fall. 4 credits.
Staff.
An application of frustration theory to the analysis of conflict and stress in organizations and society. Comparisons are made between industrial relations, race relations, international relations, and other settings. Readings include behavioral research findings from a variety of studies in industry. Relevant contributions from experimental, social, and clinical psychology are also considered.

ILROB 328 Cooperation, Competition, and Conflict Resolution
Spring. 4 credits. Prerequisite: one course in social psychology or equivalent.
An examination of theory and empirical evidence relating to the resolution of interpersonal, intergroup, and international conflict. Specific attention is devoted to studying factors that contribute to the development of cooperative or competitive bonds between parties to a conflict. The following topics are studied: the availability and use of threat; the credibility, intensity, and costs of threat; fractioning and escalating conflict. Personality and situational factors that regulate conflict intensification are stressed.

ILROB 329 Organizational Cultures
Fall or spring. 3 credits. Limited to 45 students. Prerequisite: one or more courses in sociology.
Staff.
This course reviews the concept of culture as it has evolved in sociology and anthropology, applying it to formal organizations in workplaces such as corporations and unions. The course first examines the nature of ideologies as sense-making definitions of behavior, concentrating on the cultural forms that carry these cultural messages, rituals, symbols, myths, sagas, legends, and organizational stories. Considerable attention will be given to rites and ceremonials as a cultural form in organizational life that consolidates

many of these expressive forms into one. The course will examine types of ceremonial behavior such as rites of passage, rites of enhancement, and rites of degradation, including the role of language gestures, physical settings, and artifacts in ceremonial behavior. The presence of subcultures and countercultures in organizational behavior will also receive attention, especially the part played by occupational subcultures in formal organizations.

ILROB 370 The Study of Work Motivation
Fall. 4 credits. Open to juniors and seniors.
T. Hammer.
Designed to acquaint the student with the basic concepts and theories of human motivation with implications for organizational change and job design. Focus is on theories of worker motivation and on research approaches and results as these apply to individuals and groups in formal organizations. Readings are predominantly from the field of organizational psychology, supplemented by relevant contributions from experimental, social, and clinical psychology. Each student will design, execute, and analyze a research study of his or her own.

ILROB 371 Individual Differences and Organizational Behavior
Fall or summer. 4 credits. Recommended: some acquaintance with the substance and methods of behavioral or social science
L. Gruenfeld.
This course examines personality from a comparative psychodynamic point of view. Social behavior, authority relationships, and work motivation are used to illustrate how various theories could be applied to understand behavior and experience in organizations.

ILROB 373 Organizational Behavior Simulations
Fall. 3 credits. Prerequisites: ILROB 120 and 121 or equivalent.
R. Stern.
Basic principles of organizational behavior are studied through readings and participation in four simulation games. The first game, The Organizational Game: Design, Change, and Development, by Miles and Randolph, simulates traditional organization, while the second, The Fuzzy Game, by Paton and Lockett, simulates a cooperative. A third game models executive decision making and a fourth, work organization. Organizational design, decision making, conflict, cooperation and power are the central topics of discussion. The contrasting bases of power in the organizations permits the study of the assumptions underlying organization structure and process.

ILROB 374 Technology and the Worker
Fall. 3 credits.
S. Barley.
Examines theory and research pertaining to the social implications of technology and technological change for the work worlds of blue-collar, white-collar, and professional workers. At issue are alternate conceptions of technology as a social phenomenon, approaches to the study of technology in the workplace, the reactions of individuals and groups to technological change, the construction of a technology's social meaning, and the management of technological change. A broad range of technologies will be considered, but particular emphasis will be given to automation, electronic data processing, and sophisticated microelectronic technologies, including CAD-CAM systems, telecommunication networks, medical imaging technologies, artificial intelligence, and personal computers.

ILROB 421 Studies in Organizational Behavior: Regulating the Corporation
Fall or summer. 4 credits.
R. Stern.
Will examine public and private power from an organizational perspective. The resource-dependence approach to organization-environment relations provides a framework for interpreting government attempts at the regulation of corporate behavior. Topics cover the structure and functioning of government regulatory agencies and corporate responses to regulation, including corporate strategy, change, and political influence. Business ethics and corporate social responsibility are considered along with the role of interest groups such as consumer or citizens organizations. Research and case materials focus on the implementation of environmental protection, occupational health and safety, equal opportunity, antitrust, securities, and consumer regulations.

ILROB 422 Organizations and Deviance
Fall. 3 credits.
W. Sonnenstuhl.
Focuses upon the deviant actions of organizations, including such behaviors as price fixing, environmental pollution, illegal campaign contributions, and discrimination in hiring and promotion. Examines the origins of such behaviors within organizations, the processes by which they became institutionalized, and the processes by which they become defined as deviant organizational actions. Within this context, the course will examine such contemporary cases as Exxon's Valdez oil spill, Iran–Contragate, drug testing, and the federal savings and loan scandal. These events raise troubling questions about what it means to live and work within an organizational society, and they cannot be dismissed as instances of a few individuals gone bad.

ILROB 424 Study of Public Sector Bureaucracy
Spring. 3 credits. Prerequisite: permission of instructor.
S. Bacharach.
Field research in public sector organization such as a school bureaucracy or a social welfare bureaucracy. Students conduct a major study into which they integrate themes from organizational theory. Theoretical issues such as decentralization, participation, and communication are discussed in the seminar.

ILROB 425 Sociology of Industrial Conflict
Spring. 4 credits.
R. Stern.
The focus is on the social, economic, and political causes of industrial conflict. These causes include socialization, class relations, work-non-work effects, as well as the nature of work and employment relations. The manifestations of conflict, such as strikes, labor turnover, absenteeism, and sabotage, and the influence of the environments in which they occur are emphasized.

ILROB 426 Theories of Industrial Society
Fall. 4 credits. Prerequisites: ILROB 120 and permission of instructor.
S. Bacharach.
Concentrates primarily on the works of Weber and Marx and will consist of readings in the original texts.

ILROB 427 The Professions: Organization and Control
Fall. 3 credits.
P. Tolbert.
Focus is on the sources of power and control exercised by professional groups in contemporary society. A number of issues will be examined in this context including the role of professions in society, processes through which an occupational group becomes defined as a profession, sources of control that professional associations have over their members, relations between professionals and nonprofessionals in organizations, and the relationship between unionization and professionalization of occupations.

ILROB 428 Organizational Change and Intervention
Fall. 3 credits. Limited to 25. Juniors and seniors with permission of instructor.
L. Williams.
Seminar will focus on planned and unplanned change in organizations. Topics will include mergers and acquisitions, team building, self management and the role of change agents. Participants will be required to develop and present topics in addition to keeping a weekly journal and participating in exercises.

ILROB 429 Organizational Politics and Institutional Change
Spring. 2 credits. 7 weeks. Limited.
S. Bacharach.
This course will examine the market, cultural, political, and structural forces that change the organizational "rules of the game," how those changes affect individuals and organizations, and the distortions that occur as individuals and organizations attempt to adjust to a new unstable order. Issues to be examined include power, corruption, dealmaking, rationality, uncertainty, and competition. Course requirements include completing a major research paper and leading a class discussion about it.

ILROB 471 Organizational Analysis of Trade Unions
Spring. 4 credits. Prerequisites: ILROB 120 and 121 and one additional course in organizational behavior.
Staff.
Designed to use organizational theory and research in the examination of trade unions. Study of trade unions as organizations including the discussion of the role of unions in contemporary society and the meaning of unions to individual members. Unions will be analyzed in considering them as agents of social change, interorganizational relationships, and political activity. Union members will be the focus in considering why people join unions, their commitment, problems of dual allegiance and leadership. The issue of how effective unions are as a mechanism of worker participation in management decision making is also addressed. Course material focuses on current research on unions and on strategies for further research.

ILROB 472 Applied Organizational Behavior
Fall. 3 credits. Prerequisites: ILROB 120 and 121.
S. Bacharach.
Introduces students to intermediate theory of organizational behavior. It will specifically concentrate on teaching students to use

organizational theories for analytical and applied purposes. Among the issues to be addressed are organizational structure, work processes, organizational politics, organizational design, job design, incentive systems, and quality-of-work-life programs.

ILROB 475 Organizational and Political Behavior in School Districts
Fall. 4 credits. Enrollment limited. Prerequisite: permission of instructor.
S. Bacharach.
This course is intended to provide students with research experience through the study of the administrative and governance processes in school districts. The students will be required to work with school district and union personnel while investigating the following areas: (a) structure and process of decision making in urban and rural school districts, (b) organizational conflict as reflected in school board meetings, (c) the variations in, and effect of, leadership style, as evidenced by different superintendents' advisory techniques, (d) the collective bargaining process as reflected in both contracts and actual negotiations, (e) the effect of the Taylor Law on the structure and process of decision making in school districts, and (f) the effects of administrative law on conflict in school districts. Students will be responsible for the collection of data and the presentation of a final report of their project.

ILROB 476 Unions and Public Policy in School Districts
Spring. 4 credits. Enrollment limited. Prerequisite: permission of instructor.
S. Bacharach.
A continuation of ILROB 475, but 475 is not a prerequisite. This course is strictly a research field seminar. Students will be required to work with school districts and union personnel while investigating the following areas: (a) labor contracts with school districts, (b) relations between teachers' unions, school boards, and superintendents, (c) teachers' unions' involvement with school district policies.

ILROB 478 Applied Topics in Organizational Behavior
Fall. 4 credits. Prerequisites: two courses in organizational behavior beyond the 100 level.
L. Williams.
Reading and classroom discussion will be devoted to each of three topics. The topics are industrial gerontology, with a particular focus on retirement; technology and the office; and gender and personality as organizational variables. Readings will be primarily from journal articles. Students will have a research task for each topic.

ILROB 495 Honors Program
Fall and spring (yearlong course). 3 credits each term.
For description, see the section on Collective Bargaining, Labor Law, and Labor History.

ILROB 497–498 Internship
Fall or spring. 3 and 6 credits.
For description, see the section on Collective Bargaining, Labor Law, and Labor History.

ILROB 499 Directed Studies
For description, see the section on Collective Bargaining, Labor Law, and Labor History.

ILROB 520 Micro Organizational Behavior and Analysis
Fall or spring. 3 credits.
Staff.
Survey of concepts, theories, and research from the fields of organizational and social psychology as these relate to the behavior of individuals and groups in organizations. Job attitudes, motivation, performance, leadership and power, group formation, perception, and organizational climate. A preliminary course for advanced work in organizational behavior.

ILROB 521 Macro Organizational Behavior and Analysis
Spring. 3 credits.
Staff.
Formal organizations are studied from the perspectives of classical organization theory, human relations theory, and comparative and cross-cultural analysis. Contemporary theories and quantitative approaches to organizational structure are also considered in some detail. Intended to be preliminary to more intensive work in organizational behavior.

ILROB 620 Theories of Organizational Change, Innovation, and Evaluation
Spring. 4 credits. Prerequisites: two organizational behavior courses at the 300 level, or advanced courses in sociology or psychology.
W. Sonnenstuhl.
This seminar examines the dynamics of individual, structural, and environmental factors operating in organizational change in general, and in the implementation and use of innovations within formal organizations in particular. The role of evaluative research in assessing the effectiveness of the implementation of innovations and in determining organizational effectiveness are analyzed. Several case studies of organizational change in government, unions, and private industry are examined. The emphasis is on conceptual frameworks for analyzing organizational change and mounting evaluative research on innovations. Readings are interdisciplinary and include sociology, psychology, and political science.

ILROB 621 Organizational Diagnosis Intervention and Development
Spring. 4 credits. Prerequisites: undergraduates, ILROB 120 and 121; graduate students, ILROB 520 and 521 or equivalent; and permission of instructor.
L. Gruenfeld.
This applied course considers theories and techniques for the identification and improvement of organizational problems at the behavioral (micro) level. Methods for the implementing of change are evaluated in the light of several normative and descriptive theories of individual and group development and effectiveness. The course emphasizes both quantitative and qualitative data processing procedures.

ILROB 622 Organizations and Environments
Spring. 3 credits.
P. Tolbert.
This course will survey the literature on organization-environment relations including work on organizational dependence and power, management of uncertainty, and other aspects of interorganizational cooperation and conflict. The objective of the course is to provide students with a general theoretical understanding of the way in which organizations can shape their environment and in which the environment constrains and shapes organizations.

ILROB 624 Groups in Work Organizations
Fall. 4 credits. Enrollment limited. Permission of instructor required.
L. Gruenfeld.
This is an experiential learning course designed primarily for advanced students who have a comprehensive background in the theory and methods of the behavioral sciences. Work group members study their roles and relationships to each other, the task, other work groups, and especially authorities. Students write a number of self-reflective papers in which they conceptualize their experiences and relate them to theory and method in organizational behavior and experience.

ILROB 625 Power and Bargaining
Spring. 2 credits. 7 weeks. Limited.
S. Bacharach.
This seminar will attempt to delineate the relationship between power and bargaining, specifically examining the role of tactics, power, coalitions, and bargaining structure. Seminar format.

ILROB 626 Science and Innovation in Industry
Fall. 3 credits. Prerequisites: ILROB 120, 121/520, 521 or permission of instructor.
S. Barley.
This course seeks to impart an understanding of how industrial R&D is organized, as well as an appreciation for the practical problems that arise when firms employ a significant number of scientists, engineers, and other technical workers. It is designed for students who have a general research interest in industrial R&D or who anticipate working for firms in which R&D plays an important role. The course will bring relevant theoretical perspectives to bear on pragmatic issues surrounding technical innovation and the employment of scientists and engineers. Representative topics include: the organization of scientific and technical communities, the industrialization of research, the nature of scientific and technical work, new patterns of industrial relations, organizational strategies for fostering innovation, and the careers of scientists and engineers.

ILROB 627 Leadership in Organizations
Spring. 3 credits. Prerequisites: two organizational behavior courses at the 300 level or advanced courses in sociology or psychology.
L. Gruenfeld.
An examination of theories and research findings from the behavioral sciences that are relevant to leadership and the influence process in groups and organizations. Personality, situational factors, intergroup processes, interpersonal perception as well as motivation to lead and to follow will be discussed. The implications for leadership training, organization development, and action research are explored.

ILROB 628 Cross-Cultural Studies in Organizational Behavior
Spring. 3 credits. Limited. Permission of instructor before registering in course.
L. Gruenfeld.
Designed for students interested in social psychological theory and research in international culture comparisons of behavior and experience in organizations. Variables such as power distance, individualism-collectivism, universalism-particularism and attitudes toward authority as well as work motivation will be examined. Upon completion of the readings and discussion of

conceptual materials and consideration of several major international comparison studies, each student will prepare and present a paper on a topic of his/her own choice usually related to his/her country of origin (China, Japan, German, USA, etc.).

ILROB 629 Personality in Organization
Fall. 4 credits. Open to undergraduates with permission of instructor.
L. Gruenfeld.
This advanced course considers psychodynamic theories of organizational diagnosis at the individual and group levels. Topics include leadership, power, authority, work motivation, intervention, and change. The topics are discussed and applied in small study groups. The professor's role is as a consultant and resource person. Class members study and research their own behavior and present their qualitative and quantitative findings to the class. Students are expected to have background and interest in both research methods and theory.

ILROB 671 Organizations as Social Networks
Spring. 3 credits. Prerequisites: one or more courses in organizational behavior, sociology, psychology, anthropology, or political science. A course in statistics or research methods would be helpful.
S. Barley.
Increasing attention has been devoted to the idea that social structures can be fruitfully investigated as social networks. In particular, organizational and inter-organizational structures may be analyzed as patterned relationships among individuals, groups, and even other organizations. Such networks appear to be strong predictors of a variety of social dynamics including attitude similarity, the diffusion of innovation, turnover, and the allocation of organizational resources. A variety of methods for collecting and analyzing network data including: graph theory, sociometry, clique detection, centrality analysis, blockmodeling, and the quadratic assignment procedures will be used. Recent published research will involve work with actual data sets and relevant computer programs.

ILROB 672 Motivation
Fall. 3 credits.
J. Halpern.
Motivation theories tend to reflect their authors' interests in the individual or the task. Examining these approaches will help us see how a third perspective might be helpful: that of the organizational level of analysis. Very little work has been done at this level, but we will review what exists and see how concepts from other disciplines, e.g., the sociology of work and organizational ecology, can help create a new framework for studying motivation. We will briefly examine leadership to show how a single motivational factor can be analyzed differently depending on the perspective one chooses.

ILROB 674 Social Regulation and Control of Institutions
Spring, 7 weeks only. 2 credits. Prerequisites: two organizational behavior courses at the 300 level, or advanced courses in sociology or psychology.
R. Stern.
Interorganizational relations are examined in terms of network control agents and target objects. The dynamics of control relationships based on political bargaining, the distribution of power, economic rewards and costs, and historical circumstances are examined in the context of their evolution through organizational adaptation to the environment. Subject matter includes theories of organizational change and application of a control perspective to the institutions of American business, government regulations, athletics, and education.

ILROB 675 Cooperative Strategies for Improving Organizational Performance
Spring. 4 credits.
M. Gaffney, F. Wayno.
The course will concentrate on presentation and analysis of a series of case studies involving projects using cooperative strategies to improve organizational performance. Emphasis will be given to cases in which union and management have been working together to enhance productivity and the quality of working life. Cases will be examined against a background of the research literature on improving organizational performance. Students will be responsible for a term paper.

ILROB 676 Systems of Labor Participation in Management
Fall. 4 credits. Prerequisites: senior standing and permission of instructor.
T. Hammer.
Examines the theory and practice of worker participation in systems ranging from informal shop-level participation to self-management. Special emphasis is placed on socio-technical systems of job design and work restructuring that give workers control over the labor process. Attention is also given to legislated programs of participation (codetermination) and to participation in employee-owned firms.

ILROB 677 Seminar in Field Research I
Fall. 4 credits. Enrollment limited. Prerequisite: permission of instructor.
Staff.
Recent research efforts are examined and the dynamic nature of the research process is emphasized. The realities of field research are explored, including problems of gaining and sustaining rapport, the initial development of research interviews and observation data, and their conversion to quantitative instruments. Participants share in the exploration of appropriate theories and concepts, and the possibility of actual field participation in an ongoing research project is explored.

ILROB 678 Seminar in Field Research II
Spring. 4 credits. Prerequisites: ILROB 677 and permission of instructor.
Staff.
Continuation of recent research efforts is examined, and the dynamic nature of the research process is emphasized. The realities of field research are explored, including problems of gaining and sustaining rapport, the initial development of research interviews and observation data and their conversion to quantitative instruments. Participants share in the exploration of appropriate theories and concepts, and the possibility of actual field participation in an ongoing research project is explored.

ILROB 720 Issues of Measurement in Research on Organizations (Instrumentation)
Fall. 4 credits.
T. Hammer.
Concerns the study of tests and measures used to assess central variables in organizational behavior and related fields. Students will learn where to find measures suitable for their research purposes and will examine the theories that define the constructs being measured; the empirical information available about different measures—construction, reliability, and validity; and the ways in which the instruments have been used in research and practice.

ILROB 721 Advanced Micro Organizational Behavior
Spring. 3 credits. Prerequisites: ILROB 520 and 521.
Staff.
Examines the historical development of psychological theories of organizations and contemporary issues in micro organizational research. The course will emphasize reading and analysis of primary source material.

ILROB 722 Advanced Macro Organizational Behavior
Fall. 3 credits. Prerequisites: ILROB 520 and 521.
Staff.
Examines the historical development of sociological theories of organizations and contemporary issues in macro organizational research. The course will emphasize reading and analysis of primary source material.

ILROB 723 Behavioral Research Theory, Strategy, and Methods I
Fall. 4 credits. Designed to meet the needs of M.S. and Ph.D. candidates majoring in organizational behavior, but other graduate students may enroll.
L. Williams.
Materials studied in ILROB 723 and 724 include (1) theoretical, conceptual, and ethical questions; (2) survey research and attitude-scaling procedures; (3) laboratory research methods; (4) participant observation and interview methods; (5) use of documents and qualitative data analysis. Provides students with important philosophical background for doing research and exposes them to a well-balanced, interdisciplinary set of quantitative and qualitative research tools.

ILROB 724 Behavioral Research Theory, Strategy, and Methods II
Spring. 3 credits. Designed to meet the needs of M.S. and Ph.D. candidates majoring in organizational behavior, but other graduate students may enroll.
Staff.
Course will cover (a) analysis and interpretation of quantitative data, (b) traditional problems encountered in the assessment of human and organizational characteristics, (c) the use of different methods of data analysis, and (d) an examination of the limitations imposed on data analysis and interpretation by traditional measures. Examples of topics covered in the course: the use of Chi-square, t-tests, ANOVA, simple and multiple correlation and regression, reliability and validity analyses, causal models, factor analysis, scale construction.

ILROB 725 Analysis of Published Research in Organizational Behavior
Fall. 3 credits. Prerequisites: ILROB 520 and 521 and one year of statistics.
Staff.
An advanced research methods course that critically examines published research papers in the field of organizational behavior in terms of research design and method as well as theory.

ILROB 726 Selected Topics in Organizational Behavior
Fall. 3 credits. Prerequisites: ILROB 520 and 521 and permission of instructor.
S. Barley.
An advanced proseminar that seeks to develop an interdisciplinary perspective on selected topics in organizational behavior. The topics themselves will change from year to year depending on participants' interests. Course is designed to allow students and the instructor to jointly pursue significant scholarly inquiry into one or more arenas of organizational theory. Emphasis will be placed on exploring the relevance of tradition in related disciplines (anthropology, linguistics, philosophy, sociology, etc.) that may enrich our understanding of organizational life.

ILROB 727 Work and Industrial Conflict
Spring, weeks 7–14. 2 credits.
R. Stern.
A concentrated examination of the sociology of industrial conflict. The seminar focuses on classic formulations of conflict theory in sociology, then the social, political, economic causes of industrial conflict. Both individual and collective forms of conflict expression are examined. Some discussion of the implications of various types of worker management of firms for industrial conflict will be included.

ILROB 728 Theories of Motivation and Leadership
Spring. 2 or 4 credits. Prerequisites: ILROB 520 and 521.
T. Hammer.
Two independent but sequence-connected minicourses.

(1) Theories of Work Motivation. 7 weeks. 2 credits.
Course will provide an introduction to basic concepts of human motivation in general, with particular emphasis on the theories that explain and predict work motivation. Students will examine the empirical research that tests the validity of the theories and shows how and under what conditions different motivation models can be used in practice in work organizations.

(2) Theories of Leadership and Power. 7 weeks. 2 credits.
Several current microtheories of leadership and power and related research are examined. The disciplinary perspective employed is social organizational psychology and the level of analysis emphasized is action and experience of individuals in groups.

ILROB 729 Organizational Change and Intervention
Fall. 3 credits. Graduate students only; no exceptions.
L. Williams.
This seminar is concerned with planned and unplanned change in organizations. It is designed to analyze theory in practice. Particular attention will be paid to the role of internal and external change agents. Several applied research programs such as the Center for Creative Leadership, Tavistock, and SRC will also be examined. Class members will be encouraged to analyze contemporary changes such as mergers and acquisitions.

ILROB 770 The Cultures of Work Organizations
Fall. 3 credits. Open only to graduate students.
Staff.
The course considers both administrative and occupational cultures in the workplace. It takes an anthropology perspective, focusing on ideologies as the main ingredient of cultures but emphasizing the role of cultural forms, e.g., myths, stories, sagas, language, rites and ceremonials, and physical settings of meaning. It pays special attention to the place of subcultures and countercultures in the makeup of administrative culture and to occupations as a major source of subcultures. The role of the environment in which organizations are embedded, and its influence on workplace cultures, is also included. Forms of cultural leadership and approaches to reading and changing cultures are also considered.

ILROB 772 Interpretative and Anthropological Approaches for Studying Organizations
Fall. 3 credits. Prerequisites: two graduate-level courses in organizational behavior, sociology, anthropology, or psychology.
S. Barley.
Focuses on a variety of interpretative and anthropological methods for studying and analyzing organizational life. By reading and discussing examples of published research and by conducting their own field research, students will become familiar with the following research traditions as they have been used in organization studies: participant observation, ethnography, ethnomethodology, ethnosemantics, textual analysis, graphic analysis, and critical theory. The constraints and benefits of each approach will be emphasized as will be the actual research procedures used by those who employ the approach.

ILROB 773 Advanced Seminar in Cross-Cultural Studies of Organizational Behavior
Fall. 3 credits. Permission of the instructor.
L. Gruenfeld.
Considers theory and method for the study of cross-cultural and cognitive style variables. Members participate in the conceptualization and conduct of a comparative research project.

ILROB 798 Internship
For description, see the section on Collective Bargaining, Labor Law, and Labor History.

ILROB 799 Directed Studies
For description, see the section on Collective Bargaining, Labor Law, and Labor History.

ILROB 920 Organizational Behavior Workshop
Fall. 2 credits. Limited to M.S. and Ph.D. candidates in the department. S-U grades only.
Staff.
This workshop is designed to provide a forum for the presentation of current research undertaken by faculty members and graduate students in the Department of Organizational Behavior and by invited guests. All M.S. and Ph.D. candidates in the department who are at work on their theses are strongly urged to enroll. Each student in the course will be expected to make at least one presentation during the year, focusing on the formulation, design, execution, and results of that student's thesis research.

PERSONNEL AND HUMAN RESOURCE STUDIES

J. Boudreau, chair; J. Bishop, R. Bretz, V. Briggs, L. Dyer, W. Frank, B. Gerhart, T. Judge, G. Milkovich, V. Pucik, R. Risley, E. vonBorstel, W. Wasmuth, T. Welbourne.

ILRPR 260 Personnel Management
Fall, spring, and summer. 3 credits. Open only to ILR students. Non–ILR students may take ILRPR 461.
Staff.
An introductory overview of the management of human resources. Topics include human resource decisions dealing with staffing, employee development, work-system rewards, and employee relations. Emphasis is on (a) problem-solving and decision-making approaches; (b) operational methods, technologies, and practices; (c) application of relevant behavioral science theory and research; and (d) legislation and other environmental constraints having an important bearing on the effective utilization of human resources by an enterprise.

ILRPR 266 Personal Computer Basics
Fall, spring, and summer. 2 credits. Limited to 20 students.
E. vonBorstel.
Provides basic skills in the use of IBM personal computers (PCs). It covers basic hardware, terminology, fundamentals of the Disk Operating System, LOTUS 1–2–3, and dBASE III Plus. Emphasis is placed on hands-on experience using examples demonstrating human resource issues and PC-based solutions. This course is a prerequisite to several advanced Human Resource Management electives.

ILRPR 360 Human Resource Economics and Public Policy
Fall or spring. 3 credits. Open to sophomores, juniors, and seniors.
V. Briggs, J. Bishop.
A review of labor-market trends, data collection systems, and theories pertaining to public efforts to develop the employment potential of the nation's human resources. The major segments of the nation's educational training enterprise—public education, higher education, employer-provided training, apprenticeship, and special training programs for the disadvantaged—are examined in depth. Special policy issues pertaining to youth, rural workers, welfare reform, job creation, worker relocation, economic development, targeted tax credits, industrial policy, and "enterprise zone" proposals will be examined. Comparisons are made with other industrialized nations.

ILRPR 361 Effective Supervision
Fall or summer. 3 credits. Limited to juniors and seniors. Prerequisite: ILRPR 260 or equivalent.
W. Wasmuth.
This course covers twenty-five major topics that make a critical difference in the life of a newly appointed or experienced supervisor. Theoretical and real-life case examples are provided from office, factory, union, non-union, large, and small organizations and cover technical, psychological, social, and political issues at the supervisory level.

ILRPR 362 Career Development: Theory and Practice
Fall. 2 credits. 7 weeks. Prerequisites: ILRPR 260 or permission of instructor. Limited.
J. McPherson.
The components of career management: individual factors and organizational realities in the development of both careers and organized programs for career management. Two complementary learning tasks required: information-gathering for career decision making based on self-assessment activities, and comprehension of organizational circumstances and practices encountered as careers develop. Grade based on short writing assignments and research paper.

ILRPR 365 New York State Human Resource and Employee Relations Issues and Policies
Fall or spring. 3 credits. Open to I&LR students participating in an Albany internship.
Staff.
This seminar will consider functions, current issues, and policy development in New York State human resource development and employee relations. The role of the state in protective labor law administration; human resource programs; its function as a neutral party in labor disputes in the public and private sector; and legislation affecting employee-employer relations and economic development will be reviewed. Students will be assigned individual research topics that will be discussed in the seminar and developed into a term paper.

ILRPR 366 Women at Work
Fall or spring. 3 or 4 credits. Prerequisite: ILRPR 260 or equivalent.
J. Farley.
Various aspects of female occupational roles in twentieth-century United States. Historical, social, and legal factors that influence women's choice of careers, work socialization and training, and subsequent labor-market experience are considered. Working women's entry-level jobs, opportunities for advancement, and income are compared to men's.

ILRPR 460 Human Resource Management for Small Business
Fall. 4 credits.
R. Risley.
This course will be taught using a series of case studies developed from small firms. After an initial introductory section exploring the human resource management issues most critical to the growth and development of small businesses, the balance of the course will focus on selected human resource management issues raised by the various case studies. Students will analyze the problems of each case and prepare a report setting forth their recommendations for resolving the human resource problems and achieving the desired business objectives. Every second week the class will meet for a two-hour session to present and discuss the student reports concerning each case. Owners and managers of the small business firms studied will be present to discuss each case with the students.

ILRPR 461 Human Resource Management in Organization
Fall and spring. 4 credits. Open to juniors and seniors out-of-college ONLY.
R. Bretz, W. Frank.
An introductory level survey course that is designed to introduce the student to the methods and processes of human resource management in work organizations. It is primarily intended to acquaint non-industrial relations majors with the personnel management function so that they may better understand the rationale behind human resource decisions. Factors external to the organization are discussed in regard to their impact on human resource decision making. The course includes the integration of topics such as analyzing and designing jobs; the causes and consequences of employee satisfaction, attendance, and turnover; motivating and evaluating employee performance; recruiting and selecting employees; compensating the work force; and dealing with organized labor unions. Throughout the course, emphasis is placed on the importance of the supervisor or manager in the implementation of personnel policy.

ILRPR 468 Strategic Organization and Human Resources Management Simulation
3 credits. Limited to juniors and seniors. Prerequisite: ILRPR 260 or equivalent.
W. Wasmuth.
This course uses a simulation model and an open-systems approach as means to enhance students' skills in strategic planning and managerial decision making. Attention will be given to the implications and efforts of strategic human resources managerial and supervisory decisions as measured by ten organizational performance indicators, including quality of work life, employee productivity, customer satisfaction, employee retention, internal control, and the bottom line. Each student will be assigned to a group (team) of five members and must be committed to the work of that group. An individual research paper is also required.

ILRPR 469 Immigration and the American Labor Force
Fall. 3 credits.
V. Briggs.
Assesses the role that immigration plays as a source of human resource development in the United States. Immigration will be placed in an evolutionary context but primary attention will be given to the post-1965 revival of mass immigration. In addition to legal immigration, border commuters, illegal immigration, "maquiladoras," refugees, asylees, and nonimmigrant workers are also examined. Comparisons are also made with immigration systems of other nations. Public policy aspects are explored in depth.

ILRPR 495 Honors Program
Fall and spring (yearlong course). 3 credits each term.
For description, see the section on Collective Bargaining, Labor Law, and Labor History.

ILRPR 497–498 Internship
Fall or spring. 3 and 6 credits.
For description, see the section on Collective Bargaining, Labor Law, and Labor History.

ILRPR 499 Directed Studies
For description, see the section on Collective Bargaining, Labor Law, and Labor History.

ILRPR 560 Personnel Management
Fall or spring. 3 credits. Open only to graduate students.
Staff.
A survey course covering the major areas of the management of human behavior in work organizations. Consideration is given to such aspects of strategic and human resource planning, design and management of workteams, staffing, training and management development, organization development, compensation, and employee and labor relations. Emphasis is on the application of theory and research to the solution of personnel problems.

ILRPR 653 Personnel and Human Resource Management: Policy and Practices
Fall. 4 credits. Limited to 30 students, seniors and graduate students only. Prerequisites: ILRPR 260/560, electives in personnel and human resource management, and permission of instructor.
R. Risley, B. Bretz.
This seminar will be concerned with issues of current importance to leading practitioners and explore the policies and practices developed to meet organizational goals. Changing concepts of the P/HR function within organizations and new policies and programs to meet changing needs will receive special attention. Outstanding leaders from the practitioner area will serve as guest seminar leaders during the term. Students will be required to do background reading for each topic as well as read the advanced material prepared by the guest leader. Students should be prepared to be active participants in the seminar discussions.

ILRPR 656 International Human Resources Management
Fall or spring. 3 credits. Prerequisite: ILRPR 260/560. Limited. Seniors or graduate students only or permission of the instructor.
Staff.
The focus of the course is on international human resource strategies in multinational firms. It has two major objectives: to enhance the understanding of key functional and strategic issues related to HRM activities in international firms, and to review practical applications of concepts learned from the course in leading U.S. corporations. In the first part of the course, the emphasis is on the theory of international HRM; the second part is focused on field analysis. During the semester, students will conduct TEAM research on state-of-the-art IHRM practices in leading U.S. multinationals. In addition, each student will prepare a review paper on one specific area of IHRM of his or her choice.

ILRPR 657 Employer Training: Economic and International Perspectives
3 credits.
J. Bishop.
Examines the training and learning that occurs on jobs from both an econmic and comparative international perspective. Will investigate the scale of the training enterprise, how it is accomplished, why some companies and nations train much more than others and what impact training has on organizational performance and national competitiveness. Training will also be examined from the worker's perspective. The distinction between training and learning, how individuals influence the amount of training they receive and what determines the amount and kind of training they desire. The training institutions and customs of countries like Japan, Sweden, Germany, France, and the United Kingdom will be compared to their American counterparts and an effort will be made to understand why investments in employer training are so much more substantial in Japan and Germany than in the United States and whether there is

any role for public policy in the stimulation or improvement of employer training.

ILRPR 658 Training and Development: Theory and Practice (also Education 685, Communication 685, and International Agriculture 685)
Spring and summer. 4 credits.
F 9:05–12:05. W. Frank, D. Deshler, R. Colle.
Analysis, design, conduct, administration, and evaluation of training programs for the development of human resources in small-farm agriculture, rural health and nutrition, literacy and nonformal education, and general community development. Designed for scientists, administrators, educator-trainers, and social organizers in rural and agricultural development programs in the United States and abroad.

ILRPR 659 Internal Staffing: Managing Careers in Organizations
Fall. 4 credits. Limited to 25 students. Prerequisites: ILRPR 260/560 or equivalent and one course in statistics.
T. Judge.
Analysis of the movements of people within organizations and the management of career development processes. Selected topics include job search and choice processes, career planning methods and techniques, career and life stages, mentorships, employment security programs, midlife career changes, career and family integration, criteria for internal promotions, succession planning, and the role of performance evaluation and assessment centers in placement decisions.

ILRPR 660 Seminar in Personnel or Human Resource Studies
Fall or spring. 3 credits.
Staff.
A "floating" seminar designed to give faculty and students an opportunity to pursue specific topics in detail, with an emphasis on theory and research. Topics vary from semester to semester. Interested students should consult current course announcements for details.

ILRPR 661 Applied Organizational Development Methods
Spring. 3 credits.
G. Thomas.
An experiential course that deals with OD and its role in the organizational change process. Combines the opportunity for hands-on practice in a workshop setting. Students will have responsibility for researching and writing a paper that examines a specific method, technique, or critical issue; an in-class demonstration/presentation illustrating applications of a chosen subject; and a final project requiring a comprehensive proposal that describes an appropriate and logically supported intervention strategy.

ILRPR 662 Managing an Organization through Simulation Training
Spring or summer. 3 credits. Limited to a total of 40 ILR and hotel administration students, seniors and graduate students only. Prerequisite: ILRPR 260/560 or equivalent and permission of instructor.
W. Wasmuth.
Techniques of simulation are applied to a hotel banquet facility to enable students working in a small group (task force) to accomplish the following objectives: (1) plan and develop strategies to solve a variety of realistic problems in a supportive low-risk simulated setting; (2) provide direct feedback to the participants as to the effects of their decisions on ten organizational performance indicators, including morale, turnover, productivity, customer satisfaction, and profit/loss; (3) understand the interrelationships of the indicators and of various parts of an organization through an open systems approach; (4) develop an awareness of how group interaction affects the quality and timeliness of team decision making; (5) demonstrate communication skills in organizing and reporting significant results of team accomplishments. Also, each student will prepare an individual research project that focuses on some aspect of the simulation experience.

ILRPR 663 Performance Appraisal and Organizational Effectiveness
Fall. 4 credits. Limited to 30. Prerequisites: ILRPR 260/560 and one course in statistics.
R. Bretz.
This course covers the measurement and evaluation of both individual and organizational performance. It is based on the concept that organizational effectiveness and performance are largely a function of the effectiveness and performance of individuals within the organization. Improving organizational effectiveness and productivity involves improving the effectiveness and performance of individuals and work groups that make up the organization. The course begins by exploring the concept of organizational effectiveness, proceeds with a treatment of the measurement of work performance at the individual and group levels, and concludes with an emphasis on planning, measuring, and controlling organizational performance through the integration of performance from the organization to the individual levels. Different methods of appraising performance are considered and evaluated in terms of their impact on the individual, the appraiser, and the organization.

ILRPR 664 Seminar in Organizational Communication
Spring. 3 credits. Prerequisite: permission of instructor.
W. Frank.
Seminar centers on selected issues and relevant research involved in the study of communication with formal organizations. Organizational structure and design, patterns of information flow, and individual and group determinants of communication effectiveness will be important concerns.

ILRPR 665 Case Studies in Human Resource Management Policy
Spring. 4 credits. Limited. Prerequisite: ILRPR 260/560 plus two other courses in personnel and human resource studies and permission of instructor.
Staff.
An analysis of HR management strategies and policies and their impact on organizational objectives and fair treatment of employees. Cases, incidents, and field data derived from a variety of organization settings provide a framework for examining and understanding the various effects of human resource management decisions. Students with a special interest in HRM are encouraged to use this course as a "capstone" to their studies.

ILRPR 666 Cost-Benefit Analysis for Human Resource Management
Spring. 4 credits. Prerequisites: ILRPR 260/560 or equivalent, one course in statistics, one elective in personnel and human resource studies, and permission of instructor.
J. Boudreau.
This seminar explores how to account for the contribution of personnel and human resource management programs and decisions to achieving organizational goals. It emphasizes a systematic decision-making system that organizes the discipline of personnel and human resource management and can assist in planning and evaluating programs. Topics include the role of financial-accounting statements in managing personnel and human resources, cost-benefit analysis for programs, managing human resources as a profit center, and identifying personnel and human resource management constituents to address their goals.

ILRPR 667 Employee Relations
Fall. 4 credits. Prerequisites: ILRPR 260/560 or equivalent and permission of instructor.
L. Dyer.
Explores the policies, programs, and practices used by employers to promote the just and humane treatment of employees, especially managerial, professional, and other employees not covered by collective bargaining contracts. Includes such policies as the protection of employee rights and the nature of processes used to allocate organizational opportunities and rewards; such programs as employee assistance plans and due process procedures; and elements of such practices as employee communication and supervision. Treats these as a "package" to be considered in totality and developed strategically. Considers variations in employee relations strategies, the motives of employers in establishing such strategies, and the effects of these strategies on relevant individual and organizational outcomes.

ILRPR 668 Staffing: Employee Selection and Utilization
Fall or spring. 4 credits. Limited. Prerequisites: ILRPR 260/560 or equivalent, plus ILRPR 266; one course in statistics.
T. Judge.
An analysis of the staffing process as applied to employing organizations. Topics include employment planning, recruitment, selection processes and techniques, legal issues in selection, and the relationship between staffing and other organizational practices.

ILRPR 669 Managing Compensation
Fall or spring. 4 credits. Limited to 30 students. Prerequisites: ILRPR 260/560 or equivalent, ILRPR 266 and basic statistics or permission of instructor.
B. Gerhart, G. Milkovich, R. Risley, T. Welbourne.
Major emphasis is on the decisions and issues involved in the design and administration of pay systems. Topics include behavioral and economic theories and research related to compensation, administration, and factors influencing decisions about pay levels, hierarchies, forms, and administration of pay. Also focuses on the effects of various pay systems on employee behaviors and firm performance.

ILRPR 690 Comparative Human Resource Management
Spring or fall 1993. 4 credits. Prerequisites: ILRPR 260/560, or permission of instructor.
V. Pucik.
The course surveys human resource practices in key countries and regions of the world: Germany, U.K., France, Eastern Europe, Japan, and ASEAN. The focus is on issues related to management of professional and managerial work force, such as selection and staffing,

development, and appraisal and reward systems. Special attention is given to current changes and trends in the human resource management area (e.g., Europe 92, transformation in Eastern Europe, globalization of Japanese firms). Implications for multinationals operating in these countries will also be discussed.

ILRPR 691 Human Resource Management
Spring. 4 credits. Limited. Prerequisites: ILRPR 560 or equivalent, one course in statistics, and permission of instructor.
L. Dyer, G. Milkovich.
Covers the content of human resource strategies and the process of human resource planning. The emphasis is on developing human resource strategies that are integrated with firm business strategies. Covered are methods and techniques used to forecast and plan for organization structures and processes, work force population, employee contribution, and employee morale. Much of the course is organized around a computer simulation game in which students make policy and program decisions for a fictional organization. Decisions are evaluated on the basis of their contributions to the organization's human resource and profit objectives.

ILRPR 692 Training the Displaced and Disadvantaged
Fall or spring. 3 credits. Prerequisite: permission of instructor.
J. Bishop.
Examines public and private efforts to lower unemployment and underemployment of displaced and disadvantaged workers. The seminar examines the scope of the problem, its causes, and why specific programs have worked and others have not. Topics covered will include training for displaced workers, rehabilitation of the disabled, job-search training, tax credits for hiring, vocational training, literacy instruction, EEO, public service employment, assisting new business, and industrial policy. The seminar also investigates how the structure of the economy influences the ability of targeted training and job creation to achieve sustained reductions in unemployment and draws lessons from the experience of other societies.

ILRPR 693 Design and Administration of Training Programs
Spring. 3 credits. Prerequisites: ILRPR 560 or equivalent and permission of instructor.
W. Frank, B. Bretz.
An analysis and exploration of the training and retraining function as applied in business, government, and industrial organizations. Consideration is given to learning theory as well as to the concept framework and practical approaches with which learning activities are developed at the workplace at all levels.

ILRPR 694 Human Resource Information System Applications
Spring. 4 credits. Limited to 22 students. Prerequisites: ILRPR 260/560 or equivalent; ILRPR 266; at least one upper-level PHRS elective; basic statistics; and permission of instructor.
J. Boudreau, B. Gerhart.
Explores the development, implementation and management of computerized personnel information systems and their use in human resource management. Theories and concepts relevant to the design and implementation of such systems are presented and used as the framework for hands-on experience with personal and mainframe computer systems. Students create and use applications of current popular human resource software to design their own applications and present them to the class. Where possible, student applications are based on field work in actual organizations.

ILRPR 695 Education, Technology, and Productivity
Fall. 3 credits.
J. Bishop.
The seminar investigates the nexus between the education and training occurring in schools and at the workplace and the technological progressiveness, productivity, and competitiveness of firms, individuals, and nations. We will investigate (1) how technological progress is changing the nature of work and what this implies for reform of education and training, (2) why United States productivity has not increased in the past fourteen years, (3) how education and training contribute to the growth and competitiveness, (4) why educational achievement has declined, and (5) how the responsibility for education and training should be apportioned among individuals, firms, private nonprofit organizations, and government.

ILRPR 696 Personnel Administration and Government Regulations
Fall. 4 credits. Prerequisite: ILRPR 260/560 or equivalent.
B. Bretz, T. Judge.
A survey and analysis of government legislation and regulations affecting human resource management in nongovernment organizations, examining the framework within which management must operate. Government agencies' methods of enforcement of such regulations and the firms' responsibilities for failure to comply with these legal requirements are considered. Emphasis will be on human resource policy development and administration to meet legal requirements. Topics include FLSA, OSHA, ERISA, Employee Rights, Employment at Will, Title VII, Worker's Compensation, and recent legislative developments.

ILRPR 697 Special Topics in Personnel and Human Resource Studies
Fall or spring. 3 credits.
Staff.
The areas of study are determined each semester by the instructor offering the seminar.

ILRPR 698 International Human Resource Policies and Institutions
Fall. 3 credits.
J. Bishop.
A comparative study of human resource policies and institutions in Western Europe, North America, Japan, and East Asia (with special emphasis on math and science education) and of the effects of these institutions on productivity, growth, and equality of opportunity. The institutions studied include primary and secondary education, apprenticeship and higher education. Data on the consequences of policies is presented and an effort made to understand how human resource policies and institutions have contributed to the rapid growth and low levels of inequality in Europe, Japan, and the Pacific Rim nations. Another focus of the course is understanding the causes of the low levels of achievement of American high school students relative to their counterparts abroad.

ILRPR 699 Contemporary European Labor Markets
Spring. 3 or 4 credits (1 additional credit available for those who elect to prepare a special report).
J. Bishop.
Aggregate unemployment rates in Europe have risen from 3–4 percent in the 1960s to 11 percent in the late 1980s. The course is an examination of the causes and consequences of this transformation of European labor markets. In the process of addressing these questions, we review the recent history of these economies, their labor market institutions, and government labor market policies in a comparative framework. Some European nations—Sweden, Norway, Switzerland, and Austria—have kept their unemployment rates low and the reasons for their success will be explored. The question of why economies that performed so well in the 1960s are performing so poorly now can only be addressed in the context of an overall theory of unemployment. The course examines the debate that currently rages over the causes of European unemployment and between the advocates of Keynesian, new classical (rational expectations and real business cycle theorists), and new Keynsian (efficiency wage, implicit contracts, and overlapping contracts) theories of aggregate unemployment.

ILRPR 760 Seminar in Human Resource Studies
Fall or spring. 3 credits. Prerequisites: ILRPR 560, ILRST 510/511, and ILRPR 669 and permission of instructor.
Staff.
A "floating" seminar designed to give faculty and students an opportunity to pursue specific topics in detail, with an emphasis on theory and research. Topics vary from semester to semester. Interested students should consult current course announcements for details.

ILRPR 761 Human Resource Economics and Public Policy
Spring. 3 credits.
V. Briggs.
A review of labor-market trends, data collection systems, and theories as they relate to public policy efforts to develop the employment potential of the nation's human resources. The major segments of the nation's educational training enterprise—public education, higher education, employer-provided training, apprenticeship, and special training programs for the disadvantaged—are examined in depth. Special policy issues pertaining to youth, rural workers, welfare reform, job creation, industrial policy, wage subsidies, and worker relocation will be examined. The role of research to policy formulation and methods of evaluation of social programs will be reviewed. Comparison will also be made with other industrialized nations.

ILRPR 762 Research Methods in PHRS
Fall or spring. 3 credits.
B. Gerhart.
Designed to build social science research skills, particularly in the area of personnel and human resource studies (PHRS). Topics include measurement reliability, construct validity, design of studies, external validity, meta-analysis, critiquing/reviewing PHRS research, publishing PHRS research, and applications of statistical models of PHRS issues.

ILRPR 769 Topics in Compensation Theory and Research
Fall. 4 credits. Prerequisite: ILRPR 669.
G. Milkovich, B. Gerhart.
Examines recent developments in theory, research, and practice related to compensation. Discussion emphasizes the relevance of theory and research to compensation decision making. Topics include strategic perspectives, variable compensation including gainsharing, bonus, spot awards, etc., risk and leverage in pay, egalitarian and meritorious structures, and the relationship between pay, employee behaviors, and organization.

ILRPR 798 Internship
For description, see the section on Collective Bargaining, Labor Law, and Labor History.

ILRPR 799 Directed Studies
For description, see the section on Collective Bargaining, Labor Law, and Labor History.

ILRPR 960 Workshop in Personnel and Human Resource Studies
Fall or spring. 2 credits. Enrollment limited to M.S. and Ph.D. candidates. S-U grades only.
Staff.
The workshop is designed to provide a forum for the presentation and critical discussion of current research being undertaken by graduate students, faculty members, and invited guests in the field of personnel and human resource studies. All M.S. and Ph.D. candidates in the Department of Personnel and Human Resource Studies are urged to enroll; candidates in other departments are cordially invited. Each participant will have an opportunity to benefit from the collective wisdom of the others in the formulation, design, and execution of his or her research, as well as to become current on the latest developments in the field.

INTERDEPARTMENTAL COURSES

ILRID 150 Employment Policy and Practice
Fall or spring. 3 credits.
O. Mitchell.
The object of this course is to introduce non–I&LR students to labor market policy and practice. Throughout the semester we emphasize topical issues and problems, including effective compensation policy, the value of education and training, causes and consequences of women's work and poverty, racial differences in labor market status, the political economy of income support programs, the current and future status of labor unions, the impact of baby boomers on pay and promotion, the proper role of regulation in the labor market, the productivity gap, and how trade and migration affect wages and jobs. Other topics will be added depending on student interest.

ILRID 451 Science, Technology, and the American Economy
Fall or spring. 4 credits.
V. Briggs.
The industrial revolution did not begin in the United States, but the nation became the world's first technological society. Attention will be given to the evolutionary confluence of science, technology, mathematics, and capitalism in the formation of the U.S. economy and its labor force. Primary attention will be given to the post-World War II economic developments associated with electronics and biotechnology. The vantage point will be the linkage with employment, unemployment, income, and productivity considerations. Public policy issues (such as research and development policy, national defense influences, the "agricultural revolution," savings and investment rates, labor force preparedness) will be explored. The policies of other industrial nations and the implications of the globalization of technology for the future will also be discussed.

ILRID 452 Writing in Industrial and Labor Relations
Fall or spring. 3 credits. Limited to 20 students.
J. Farley.
This course will require close reading of five books in the field of industrial and labor relations and careful writing about them. Students will also have an opportunity to practice writing about the world of work for different audiences.

ILR EXTENSION

Metropolitan

The following courses are open only to participants in the Extension Division in New York City. These courses are not open to undergraduate or graduate students matriculated in the Ithaca ILR programs. ILR Credit and Certificate Program courses at the Labor College are offered for four credits. Courses and course credits earned in Extension Division certificate programs are not automatically accepted as transfer credits or as a basis of admission to the resident ILR undergraduate and graduate programs in Ithaca. Student applications for course transfer are evaluated by the ILR school on an individual basis.

210 Statistical Reasoning I
Fall or spring. 4 credits.
An introduction to the basic concepts of statistics: measures of location and dispersion, estimation and confidence intervals, hypothesis tests, regression and correlation. Students are taught to use a computer at the beginning of the term and use it for weekly assignments.

260 Personnel Management
Fall or spring. 3 credits.
Focuses on management of personnel in organizations. Deals with manpower planning, recruiting, selection, wage and salary administration, training, performance appraisal, organizational development, and the administration of personnel department activities. Special attention is paid to government manpower policy and its implication for personnel management.

301 Labor Union Administration
Fall or spring. 3 credits.
A review of the operations of American unions, including a general theoretical framework but with major emphasis on practical operating experience. The course will consider the formal government of unions; organizational or institutional purposes and objectives and how these are achieved; underlying structure and relationship among members, locals, and national organizations; the performance of the primary function of organizing; negotiating; contract administration; and the effect of the Landrum-Griffin Act.

326 Sociology of Occupations
Fall or spring. 3 credits.
Focuses on (1) the changing character of American occupations within the context of social change; (2) occupational status—differences in income, prestige, and power and the resultant general phenomenon of social stratification; (3) vertical and horizontal occupational mobility; (4) recruitment and socialization into occupational roles; (5) the process of professionalization; and (6) comparison of personnel occupations with the career and organizational patterns of other occupations. A major sociological theme is the relationship between occupational structure and workplace structure.

346 Economics of Collective Bargaining
Fall or spring. 3 credits.
Economic aspects of the negotiation, terms, and effects of union-management agreements at the individual firm, industry regional, and national levels. Topics examined include forces influencing contract demands and terms, employer adaptation to higher wages and benefits; interindustry differences in competitiveness, firm size, and markets; regional location of industry, international competition; government regulations; labor supply; inflation, recession, and unemployment.

350 History of Industrial Relations in the United States
Fall or spring. 3 credits.
This review of the history of industrial relations in the United States emphasizes developments in the twentieth century. The course concentrates on the American worker, both union and nonunion; labor movements; and the environmental forces that have shaped industrial relations in the United States. Readings are selected from scholarly accounts and original sources.

351 Collective Bargaining
Fall or spring. 3 credits.
A comprehensive study of collective bargaining; the negotiation and scope of contracts; the day-to-day administration of contracts; the major substantive issues in bargaining, including their implication for public policy; and the problem of dealing with industrial conflict.

352 Labor Relations Law and Legislation
Fall or spring. 3 credits.
A survey of the law governing labor relations. The legal framework in which the collective bargaining relationship is established and bargaining takes place is analyzed. Problems of the administration and enforcement of collective agreements are considered, as are problems of protecting individual employee rights in the collective labor relations context. Also serves as an introduction to the legal system and method and to legal and constitutional problems of governmental regulation of industrial and labor relations.

353 Statistics (Statistical Reasoning)
Fall or spring. 3 credits.
An introduction to the basic concepts of statistics: description of frequency distribution (averages, dispersion, and simple correlation) and introduction to statistical inference. Prerequisite to certain specialized courses on applications of statistics offered in various departments.

367 Safety and Health in the Workplace
Fall or spring. 3 credits.
To provide basic education and training in workplace safety and health. The course will focus on applicable federal and state laws, standards for safety and health, industrial hygiene, and such health concerns as asbestos, radon, and AIDS. Practical experience will be provided through workplace walk-through safety and health inspections and in use of industrial hygiene equipment that measure noise, temperature, humidity, airflow, and airborne toxics.

400 Union Organizing
This course explores various aspects of unions' attempts to organize workers; why some workers join unions and others do not; the techniques used by both unions and employers during organizing campaigns; and the present law of organizing and proposed amendments to the law.

440 Health, Welfare, and Pension Plans
Fall or spring. 3 credits.
An analysis and appraisal of private health, welfare, and pension plans. A consideration of the origin and development of employer, union, and joint programs and a critical examination of the financing, administration, and general effectiveness of the plans.

602 Arbitration
Fall or spring. 3 credits.
A study of the place and function of arbitration in the field of labor-management relations, including an analysis of principles and practices, the law of arbitration, the handling of materials in briefs or oral presentation, the conduct of an arbitration hearing, and the preparation of an arbitration opinion.

681 Labor Relations Law
Fall or spring. 3 credits.
An advanced course in labor law, covering such topics as emergency labor disputes, legal problems of labor relations in public employment, labor and the antitrust laws, civil rights legislation, rights of individual employees and union members, and legal problems of union administration.

684 Employment Discrimination and the Law
Fall or spring. 3 credits.
An examination of legal problems involving employment discrimination based upon race, color, religion, sex, national origin, or age. The impact of developing principles of law on preemployment inquiries and testing, seniority and promotions, and other personnel policies, practices, and procedures will be discussed. The prerequisites of affirmative action under Executive Order No 11246, as amended, will be analyzed. Special attention will be given to the role of state law in resolving employment discrimination claims and the procedural framework for raising and adjudicating such claims before administrative agencies and the courts.

687 Current Issues in Collective Bargaining
Fall or spring. 3 or 4 credits.
An intensive study of the most significant current issues and problems facing employers and unions in their relations with each other, with particular emphasis on the substantive matters in contract negotiations and administration of the provisions of collective bargaining agreements. A major research paper is usually required.

Statewide

The following courses are open to participants in the Extension Division's statewide credit programs in labor studies and management studies. Extension offices are based in Buffalo, Albany, Rochester, Ithaca, New York City, and Long Island. These courses are not open to undergraduate or graduate students matriculated in the Ithaca ILR programs.

241 Arbitration
3 credits.
A study of the place and function of arbitration in the field of labor-management relations, including an analysis of principles and practices, the law of arbitration, the handling of materials in briefs or oral presentation, the conduct of an arbitration hearing, and the preparation of an arbitration opinion.

242 Public Sector Collective Bargaining
Fall or spring. 3 credits.
This course is designed as an introduction to collective bargaining in the public sector. The course examines the historical development of bargaining in public employment, the evolution of state and federal and bargaining theory and practices, as well as impasse resolutions techniques frequently found in this sector. Special emphasis will be given to developing an understanding of the similarities and differences between public and private sector bargaining and how they have affected tactics and strategies employed by the parties.

243 Growth of American Business and Management History
Fall or spring. 3 credits.
The growth and cycles of American business enterprise produced significant changes in education, government, work, the family, the ethnic composition of the population, and the landscape. As business and industry expanded, new methods evolved for managing these enterprises. This course will examine the development of managerial practices, the relationship of management to the work force, and the social ramifications of capitalist expansion.

245 Public Sector Labor Law
3 credits.
A survey and analysis of the New York State Public Employees Fair Employment Act is made as well as a comparison with other state laws covering public employees. The course will examine the extent to which the law protects and regulates concerted actions by employees in the public sector. The intent is to study and understand the law as written, but more importantly how it has been interpreted by the courts of New York State in its application. Major emphasis will be employee and employer rights, including recognition and certification, improper practices, strikes, grievances, and disciplinary procedures of the New York State Public Employment Relations Board.

247 Labor and the American Economy
3 credits.
Will help the student understand how economic theories relate to the economic problems confronting the American citizen in general and the American union member in particular. Emphasis will be placed on contemporary economic theories and how their proponents attempt to solve American economic problems.

251 Principles and Practices of Management
Fall or spring. 3 credits.
Presents the theory and processes of management with an emphasis on supervision. Management functions of planning, organizing, staffing, and evaluating are included. Concepts and theories are presented, and case studies are analyzed. Motivating people, exercising leadership, and effectively developing employees are emphasized.

252 Contract Bargaining
Fall or spring. 3 credits.
Examines the principles of contract bargaining, including bargaining environments and structures as well as standards used in bargaining. Students will learn to prepare bargaining demands, cost economic items, draft noneconomic contract language, negotiate economic and noneconomic issues, and resolve a contract bargaining impasse. The course will consider the impact of contract bargaining outcomes on workers, unions, employers, and the public.

253 Contract Administration
Fall or spring. 3 credits.
Focuses on the role of the steward in administering the union contract in the workplace. Students will evaluate grievance and arbitration contract clauses, the grievance procedure in practice, the role of the union steward, the role of local and international unions, negotiation of grievances, and preparation for arbitration. Students will analyze the impact of grievance and arbitration procedures on workers, unions, and employers.

254 Labor Law
Fall or spring. 3 credits.
Examines the principles of labor law by looking at social philosophy and the historical context of federal labor legislation from the 1930s. Students will concentrate on major provisions of the National Labor Relations Act, examining how the National Labor Relations Board and the federal courts have interpreted the national labor laws. Discussion will include new directions in labor legislation and interpretation with consideration given to the impact of labor law on workers, unions, and employers.

255 Labor History
Fall or spring. 3 credits.
Reviews American labor history from the prespective of workers' social dimensions of the development of the working class, reform and revolutionary movements, and the emergence of craft, industrial, and public employee unions. Included will be a discussion of the development of trade union institutions and leaders and the evolution of union political activities and collective bargaining. Special attention will be paid to the involvement of women and minority workers with unions.

256 Dispute Resolution
Fall or spring. 3 credits.
Examines third-party participation in dispute resolution in private and public sector collective bargaining. Development of dispute resolution methods in American labor relations; issues and practices in neutral, binding arbitration of grievances and mediation; conciliation; and fact finding procedures will be discussed. We will also look at exclusive labor-management mechanisms to settle industry disputes.

257 Personnel Administration
Fall or spring. 3 credits.
Designed to provide an overview of personnel practices in the modern organization. It will focus on manpower planning, employment, training and development, motivation and compensation, and performance appraisal and communication for students who are currently supervisors or personnel practitioners or for those aspiring to those positions.

258 Organizational Behavior
Fall or spring. 3 credits.
Designed to illustrate how behavioral science theory leads to research and how theory and research provide a basis for practical application in business, industry, education, and government.

259 Union Administration
Fall or spring. 3 credits.
Focus is on the principles and practices of effective union administration. Students will study the dynamics of democratic organizations and the development of organizational leadership. The course explores alternative methods of decision making and lines of responsibility. The legal obligations of unions and union officials will be discussed and analyzed. The course also examines the structure and evolution of relationships inside the labor movement.

263 Trends in Worker Participation
Fall or spring. 3 credits.
This course will examine the existence of worker participation models in the context of our changing global economy. We will examine both the external and internal forces that are giving rise to greater labor-management cooperation on the one hand, and increased management hostility toward unions, on the other. We will examine the historical struggle of workers and management for control over the work process and the impact that decades of Taylorism have had in shaping the labor-management relationship. We will review worker participation structures in Germany, Sweden, and Japan, and discuss their usefulness as a model for the American workplace. Finally, it will examine case studies of joint-decision making approaches in U.S. workplaces, with a special emphasis on the auto industry.

264 Contemporary Labor Problems
Fall or spring. 3 credits.
A survey of the major challenges that confront the American labor movement. Students are briefed on the background of each problem and discuss and analyze a broad range of solutions proposed by the experts.

357 Labor Education I
Fall or spring. 3 credits.
An examination will be made of labor education and its origin, development, scope, form, functions, curricula, goals, issues, and roles in universities, unions, and other organizations. Attention will be devoted to various practical aspects associated with the administration of programs and to labor education as an occupation. The course will involve students in field activities in connection with current Extension Division programs.

358 Labor Education II
Fall or spring. 3 credits.
The course will be divided into two parts: Part I is planned to develop an understanding of the theories of program organization and administration, including budgeting, which is necessary if labor education is to be transferred to the local union level. Part II joins theory and practice in the effort to (1) provide rank and file union leaders with the opportunity to develop and use research skills, (2) garner subject matter expertise, (3) formulate course outlines from which to teach, and (4) select appropriate teaching methods and prepare materials for classroom use. Practice teaching is a necessary component of such an advanced course, again providing experiences that combine theory and practice.

359 Directed Studies in Labor Education
Fall or spring. 3 credits.
Designed to grant credit for fieldwork under the direction of members of the faculty. Third semester of an intensive training program in labor education for mature students with demonstrated ability to undertake independent work who have been carefully screened and selected for participation in this course. Combines 180 hours of fieldwork in a union education or related program with 3-hour seminars in the classroom. Classroom meetings are devoted to (1) in-depth analysis of union experiences in relation to labor education, theory, method, and techniques, and (2) individual consultations.

360 Labor Education III
2 credits.
This is a course designed to give labor educators advanced teaching techniques and specific methodology for expanding their training. Instruction will be combined with practical teaching experience in three, three-hour laboratories. Students will learn to polish their presentation style by studying voice projection, rhetorical techniques, timing and pacing of class units, controlling individual disruptors to the progress of the class, and, finally, summarizing the work accomplished.

363 Wages and Salary System Design
3 credits.
An examination of compensation practices and special issues affecting wage and salary systems. Topics to be discussed include: determining pay level and structure, employee equity, incentive plans, and performance evaluation. Will also examine benefits and legislation that are relevant to compensation practices and theories.

364 Labor, Government, and Politics
3 credits.
A survey of the ways the American political system affects labor and how organized labor affects the system through voting, political parties, and interest groups.

FACULTY ROSTER

Abowd, John M., Ph.D., U. of Chicago. Prof., Labor Economics
Bacharach, Samuel, Ph.D., U. of Wisconsin. Prof., Organizational Behavior
Barley, Stephen R., Ph.D., Mass. Inst. of Technology. Assoc. Prof., Organizational Behavior
Bishop, John H., Ph.D., U. of Michigan. Assoc. Prof., Personnel and Human Resource Studies
Boudreau, John W., Ph.D., Purdue U. Assoc. Prof., Personnel and Human Resource Studies
Boyer, George R., Ph.D., U. of Wisconsin. Assoc. Prof., Labor Economics
Bretz, Robert D. Jr., Ph.D., U. of Kansas. Asst. Prof., Personnel and Human Resource Studies
Briggs, Vernon M., Jr., Ph.D., Michigan State U. Prof., Personnel and Human Resource Studies
Brooks, George W., M. A., Brown U. Prof. Emeritus, Collective Bargaining, Labor Law, and Labor History
Bunge, John A., Ph.D. Ohio State U. Asst. Prof., Economic and Social Statistics
Crivens, Thelma A., J. D., George Washington U. Asst. Prof., Collective Bargaining, Labor Law, and Labor History
Daniel, Cletus E., Ph.D., U. of Washington. Prof., Collective Bargaining, Labor Law, and Labor History
DeVault, Ileen A., Ph.D., Yale U. Asst. Prof., Collective Bargaining, Labor Law, and Labor History
Dyer, Lee D., Ph.D., U. of Wisconsin. Prof., Personnel and Human Resource Studies
Ehrenberg, Ronald, Ph.D., Northwestern U. Irving M. Ives Professor of Industrial and Labor Relations and Economics, Labor Economics
Farley, Jennie T., Ph.D., Cornell U. Prof., Extension
Fennell, Dorothy E., Ph.D., U. of Pittsburgh. Asst. Prof., Extension & Public Service
Fields, Gary S., Ph.D., U. of Michigan. Prof., Labor Economics
Frank, William W., Ph.D., Michigan State U. Prof. Emeritus Extension/Personnel and Human Resource Studies
Gerhart, Barry A., Ph.D., U. of Wisconsin. Assoc. Prof., Personnel and Human Resource Studies
Gold, Michael E., LL.B., Stanford U. Assoc. Prof. Collective Bargaining, Labor Law, and Labor History
Gray, Lois S., Ph.D., Columbia U. Prof., Extension
Gross, James A., Ph.D., U. of Wisconsin. Prof., Collective Bargaining, Labor Law, and Labor History
Gruenfeld, Leopold W., Ph.D., Purdue U. Prof., Organizational Behavior
Hadi, Ali S., Ph.D., New York U. Assoc. Prof., Economic and Social Statistics
Halpern, Jennifer, Ph.D. candidate, UCLA at Berkeley. Lecturer, Organizational Behavior
Hammer, Tove H., Ph.D., U. of Maryland. Prof., Organizational Behavior
Hanratty, Maria, Ph.D., Harvard University. Asst. Prof., Labor Economics
Hurd, Richard W., Ph.D., Vanderbilt U. Prof., Extension and Public Service
Hutchens, Robert M., Ph.D., U. of Wisconsin. Prof., Labor Economics
Jakubson, George H., Ph.D., U. of Wisconsin. Assoc. Prof., Labor Economics
Judge, Timothy A., Ph.D., U. of Illinois. Asst. Prof., Personnel and Human Resource Studies
Katz, Harry C., Ph.D., U. of California at Berkeley. Prof., Collective Bargaining, Labor Law, and Labor History
Korman, A. Gerd, Ph.D., U. of Wisconsin. Prof., Collective Bargaining, Labor Law, and Labor History
Kuruvilla, Sarosh C., Ph.D., U. of Iowa. Asst. Prof., Collective Bargaining, Labor Law, and Labor History
Lieberwitz, Risa L., J. D., U. of Florida. Assoc. Prof., Collective Bargaining, Labor Law, and Labor History

Lipsky, David B., Ph.D., Massachusetts Inst. of Technology. Prof., Collective Bargaining, Labor Law, and Labor History

McCarthy, Philip J., Ph.D., Princeton U. Prof. Emeritus, Economic and Social Statistics

Milkovich, George, Ph.D., U. of Minnesota. Prof., Personnel and Human Resource Studies

Mitchell, Olivia S., Ph.D., U. of Wisconsin. Prof., Labor Economics

Pucik, Vladimir, Ph.D., Columbia U. Assoc. Prof., Personnel and Human Resource Studies

Rebick, Marcus E., Ph.D., Harvard U. Asst. Prof., Labor Economics/International and Comparative Labor Relations

Risley, Robert F., Ph.D., Cornell U. Prof., Emeritus, Personnel and Human Resource Studies/Extension

Ross, Philip, Ph.D., Brown U. Prof., Collective Bargaining, Labor Law, and Labor History

Salvatore, Nicholas, Ph.D., U. of California at Berkeley. Assoc. Prof., Collective Bargaining, Labor Law, and Labor History

Seeber, Ronald L., Ph.D., U. of Illinois. Assoc. Prof., Extension

Smith, Robert S., Ph.D., Stanford U. Prof., Labor Economics

Sonnenstuhl, William J., Ph.D., New York U. Asst. Prof., Extension & Organizational Behavior

Stern, Robert N., Ph.D., Vanderbilt U. Prof., Organizational Behavior

Tolbert, Pamela S., Ph.D., U. of California. Assoc. Prof., Organizational Behavior

Turner, Lowell R., Ph.D., U. of California. Asst. Prof., Collective Bargaining, Labor Law and Labor History/International and Comparative Labor Relations

Velleman, Paul F., Ph.D., Princeton U. Assoc. Prof., Economic and Social Statistics

vonBorstel, Ernest, MBA, Cornell U. Lecturer, Personnel and Human Resource Studies

Wasmuth, William J., D.B.A., Indiana U. Prof. Emeritus, Extension/Personnel and Human Resource Studies

Wells, Martin T., Ph.D., U. of California at Santa Barbara. Asst. Prof., Economic and Social Statistics

Williams, Lawrence K., Ph.D., U. of Michigan. Prof., Organizational Behavior

Windmuller, John P., Ph.D., Cornell U. Prof. Emeritus, Collective Bargaining, Labor Law, and Labor History/ International and Comparative Labor Relations

LAW SCHOOL

ADMINISTRATION

Russell K. Osgood, dean of the law faculty and professor of law

Jane L. Hammond, law librarian and professor of law

Robert A. Hillman, associate dean for academic affairs and professor of law

Anne Lukingbeal, associate dean and dean of students

Albert C. Neimeth, associate dean and director of alumni affairs

Frances M. Bullis, associate dean for development and public affairs

Richard D. Geiger, assistant dean and dean of admissions

LAW SCHOOL

The primary function of the Law School is to prepare attorneys for both public and private practice who are equipped to render skillful professional service and who are conscious of the important role played by the law as a means of social control. The curriculum is designed to prepare students for admission to the bar in all American states and territories.

Ordinarily, a student who is admitted to the Law School must have a baccalaureate degree from an approved college or university. The course of study leading to the degree of Doctor of Law (J.D.) covers three academic years. A number of students will be admitted to a program of study leading to the degree of Doctor of Law "with specialization in international legal affairs."

There are combined graduate degree programs with the Johnson Graduate School of Management, the College of Arts and Sciences, the Department of City and Regional Planning, the School of Industrial and Labor Relations, and the graduate divisions in economics, history, and philosophy, as well as a special opportunity for highly qualified undergraduates in the College of Arts and Sciences to register in the Law School during their senior year.

The graduate program of the Cornell Law School admits only a few students each year. The LL.M. degree (Master of Laws, Legum Magister) and the J.S.D. degree (Doctor of the Science of Law, Jurisprudentiae Scientiae Doctor) are conferred. A small number of law graduates may also be admitted as special students, to pursue advanced legal studies without being degree candidates.

For further information, refer to the Law School catalog, obtainable from the office of the registrar, Myron Taylor Hall.

FIRST-YEAR COURSES

500 Civil Procedure

502 Constitutional Law

504 Contracts

506 Criminal Justice

507 Legal Process

508 Practice Training I

509 Practice Training II

512 Property

515 Torts

UPPERCLASS COURSES

602 Administrative Law

604 Advanced Civil Procedure

605 Alternative Dispute Resolution

609 Antitrust Law

610 Arbitration [also ILR 602]

612 Banking Law and Regulation

613 Bioethics and Law

614 Civil Rights Legislation

616 Commercial Law

618 Comparative Law

620 Conflict of Laws

621 Constitutional Law II: The First Amendment

624 Corporate Finance

625 Corporations

627 Criminal Procedure

628 Debtor-Creditor Law

629 Directed Reading

633 Employment Law

634 Entertainment Law

635 Environmental Aspects of Water Law

636 Environmental Law

637 Environmental Litigation

640 Evidence

642 Family Law

643 Federal Courts

644 Federal Income Taxation

645 Feminism and Gender Discrimination [also A&S Womens 466]

646 Feminist Jurisprudence

649 Government Benefits Clinic

651 Insurance

652 Intellectual Property

653 International Business Transactions

654 International Commercial Arbitration

655 International Human Rights

656 International Litigation

657 International Protection of Intellectual Property

658 International Taxation

659 Judicial Remedies

660 Labor Law

662 Land-Use Planning

665 Law and Economics

667 Law and the Disabled

668 Lawyers and Clients

672 Local Government

673 Modern Japanese Law

675 Negotiation for Lawyers

676 Political Obligation and Civil Disobedience [also Phil. 343]

677 Products Liability

679 Public International Law

681 Russian Law

682 Securities Regulation

683 Social Security, Families, and Administrative Justice

685 Sports Law

686 Supervised Writing

687 Supervised Teaching

688 Taxation of Corporations and Shareholders

692 Trial Advocacy

694 Trusts and Estates

PROBLEM COURSES AND SEMINARS

700 African-Americans and the Supreme Court

701 American Legal Theory

702 Arbitration

703 Biblical Law

704 Business Reorganizations

705 Capital Punishment Clinic

706 Children in Litigation Seminar

707 Civil Liberties Clinic

708 Commercial Shopping Center Development

709 Constitutional Law and Political Theory

717 Employment Discrimination

722 Environmental Crimes

723 The European Economic Community—Integration through Law

725 Family Law Clinic

726 Federal Regulatory Agencies: Law and Policy

732 Immigration and Refugee Law

736 International Law and Arms Control

740 Judicial Externship

741 Labor Law Policy Seminar [also ILR 608]

742 Law and Medicine

743 Law Guardian Externship

744 Law, Science, and Technology

745 Law, Theory and Practice in the Financial Markets

747 Lawyers and the Legal Profession

752 Legal Aid I

753 Legal Aid II

756 Legal Aspects of Real Estate Development

758 Legislative Externship

759 Litigation in Federal Courts

760 Neighborhood Legal Service Externships

763 Organized Crime Control

765 Problems in Private International Law

768 Readings in Criminal Procedure

772 Seminar on the Psychology of Law

774 Separation of Powers

775 Sovereignty, Self-Determination, and Secession

777 Theories of Property

FACULTY ROSTER

Abrams, Kathryn, J.D., Yale U. Prof.
Alexander, Gregory S., J.D., Northwestern U. Prof.
Barcelō, John J. III, S.J.D., Harvard U. A. Robert Noll Professor of Law
Beresford, H. Richard, M.D., U. of Colorado. Visiting Prof.
Black, Alexander, J., LL.M., U. of British Columbia. Visiting Prof.
Clermont, Kevin M., J.D., Harvard U. James and Mark Flanagan Professor of Law
Cramton, Roger C., J.D., U. of Chicago. Robert S. Stevens Professor of Law
Cripps, Yvonne M., Ph.D., U. of Cambridge. Visiting Prof.
Eisenberg, Theodore, J.D. U. of Pennsylvania. Prof.
Farina, Cynthia R., J.D., Boston U. Prof.
Fentiman, Richard G., LL.B., U. of Oxford. Visiting Prof.
Green, Robert A., J.D., Georgetown U. Asst. Prof.
Hammond, Jane L., J.D., Villanova U. Prof.
Hammond, R. Grant, J.D., Auckland U. Visiting Prof.
Hausmaninger, Herbert, Dr.jur., Graz. Visiting Prof.
Hay, George A., Ph.D., Northwestern U. Edward Cornell Professor of Law and Professor of Economics
Henderson, James A., Jr., LL.M., Harvard U. Frank B. Ingersoll Professor of Law
Hillman, Robert A., J.D., Cornell U. Prof.
Hirshman, Linda, J.D., Chicago U. Visiting Prof.
Holden-Smith, Barbara J., J.D., U. of Chicago. Asst. Prof.
Johnson, Sheri L., J.D., Yale U. Prof.
Kent, Robert B., LL.B., Boston U. Prof.
Lyons, David B., Ph.D., Harvard U. Susan Lynn Sage Professor of Philosophy and Professor of Law
Macey, Jonathan R., J.D., Yale U. J. DuPratt White Professor of Law
Maclin, M. Tracey, J.D., Columbia U. Visiting Prof.
Martin, Peter W., LL.B., Harvard U. Jane M. G. Foster Professor of Law
Oda, Hiroshi, LL.D., Tokyo U. Visiting Prof.
Osgood, Russell K., J.D., Yale U. Prof.
Palmer, Larry I., LL.B., Yale U. Prof.
Roberts, Ernest F., LL.B., Boston C. Edwin H. Woodruff Professor Law
Rossi, Faust F., J.D., Cornell U. Samuel S. Leibowitz Professor of Trial Techniques
Rudden, Bernard A., D.C.L., Oxford. Visiting Prof.
Schwab, Stewart J., Ph.D., U. of Michigan. Prof.
Shapiro, Howard M., J.D., Yale U. Assoc. Prof.
Shiffrin, Steven H., J.D. Loyola U. of Los Angeles. Prof.
Siliciano, John A., J.D., Columbia U. Prof.
Simson, Gary J., J.D. Yale U. Prof.
Stone, Katherine V., J.D., Harvard U. Prof.
Straus, Joseph, J.D., Munich U. Visiting Prof.
Summers, Robert S., LL.B., Harvard U. William G. McRoberts Research Professor in Administration of the Law
Taylor, Winnie F., LL.M., U. of Wisconsin. Prof.
Thel, Steven S., J.D., Harvard U. Visiting Prof.
Tucker, Bonnie P., J.D., U. of Colorado. Visiting Prof.
Varady, Tibor, S.J.D. Harvard U. Visiting Prof.
Williams, David C., J.D., Harvard U. Assoc. Prof.
Williams, Susan H., J.D., Harvard U. Prof.
Wippman, David, J.D., Yale U. Assoc. Prof.
Wolfram, Charles W., LL.B., U. of Texas. Charles Frank Reavis Sr. Professor of Law

Lecturers

Galbreath, Glenn G., J.D., Case Western Reserve U. Senior lecturer
Miner, JoAnne M., J.D., U. of Connecticut. Senior Lecturer
Peterson, Karen A., J.D., Boston U. Lecturer
Seibel, Robert F,. J.D., Northeastern U. Senior Lecturer
Strom, Barry, J.D., Cornell U. Senior Lecturer

Academic Library Staff

Hammond, Jane L., J.D., Villanova U. Edward Cornell law librarian and professor of law
Hasko, John J., M.S.L.S., U. of Illinois. Associate law librarian
Hillmann, Diane I., M.S.L.S., Syracuse U. Head of technical services
Beehler, Sandra A., M.L.S., Indiana U. Acquisitions librarian
Pajerek, Jean M., M.L.S., SUNY-Albany. Head of cataloging
O'Connor, Linda Karr, M.L.S., U. of California, Los Angeles. Reference librarian
Court, Patrica G., M.L.S., Indiana U. Reference librarian

Members of Other Faculties Associated with the Law School

Carmichael, Calum M., B. Litt., Oxford U. Prof. College of Arts and Sciences
Gross, James A., Ph.D., U. of Wisconsin. Prof. School of Industrial and Labor Relations
Hyams, Paul R., D. Phil., Oxford U. Assoc. Prof., College of Arts of and Sciences
Scheinman, Lawrence, Ph.D., U. of Michigan. Prof., College of Arts and Sciences

Adjunct Faculty Members

Abrams, Sarah K., M.S., Massachusetts Institute of Technology. Adjunct Prof.
Blyth, John, Dr.jur., Goethe U. Adjunct Prof.
Briggs, W. Buckley, J.D., Georgetown U. Adjunct Prof.
Colapietro, Bruno, J.D., Cornell U. Adjunct Prof.
Diana, Peter A., J.D., Cornell U. Adjunct Prof.
Goldstock, Ronald G., J.D., Harvard U. Adjunct Prof.
Hearst, Alice, J.D., U. Washington. Adjunct Prof.
Lenhart, J. Thomas, J.D., Columbia U. Adjunct Prof.
Levao, Richard A., J.D., Cornell U. Adjunct Prof.
Pinissi, Michael D., J.D., Cornell U. Adjunct Prof.
Yale-Loehr, Stephen W., J.D., Cornell U. Adjunct Prof.

Practitioners in Residence

Allen, William H., L.L.B., Standford U. Pract.
Hughes, Kathleen A., J.D., Loyola U. Pract.
Rapp, Robert N., J.D., Case Western Reserve U. Pract.

JOHNSON GRADUATE SCHOOL OF MANAGEMENT

ADMINISTRATION

Alan G. Merten, dean

Thomas R. Dyckman, associate dean for academic affairs

James W. Schmotter, associate dean

Ann L. Calkins, assistant dean for external relations

John A. Elliott, director, doctoral program

Nancy Milne, director of admissions

Paul Brenner, director of corporate relations

Harriet Peters, director of advising and student activities

John P. McKeown, director of finance and business operations

L. Joseph Thomas, director of the Executive Development Program

Craig M. McAllaster, director of executive education

Eugene Ziegler, director of computing services

Donald Schnedeker, librarian

Rhea J. Nickerson, assistant to the dean

Nancy A. Culligan, business manager and director of personnel

Linda Myers, managing editor, *Cornell Enterprise*, and publications coordinator

Linda Pike, managing editor, *Administrative Science Quarterly*

Ann W. Richards, registrar and financial aid associate

The Johnson Graduate School of Management prepares men and women for managerial careers in business. The school offers course work in many disciplines to provide potential managers with an understanding of the complexities of the professional world in which they will operate and of the organizations of which they will become a part.

A bachelor's degree or its equivalent is required for admission to the two-year program leading to the Master of Business Administration (M.B.A.) degree. Nearly half of the students have a background of undergraduate studies in arts and sciences, and about one-quarter in engineering. Five percent of the students begin their graduate training immediately after receiving their bachelor's degrees and the remaining 95 percent following work experience.

Combined degree programs allow highly qualified Cornell students to co-register in the school during their senior year, thereby earning a master's degree in less than the usual time.

The doctoral program, administered through the Graduate School, provides an advanced level of education in business for those who seek careers in teaching and research at leading universities.

More detailed information about these programs is available from the Office of Admissions and Student Affairs, Johnson Graduate School of Management, Malott Hall.

Students in other graduate programs and undergraduate students registered with the university are welcome in many classes. Since matriculated MBA students require certain courses for graduation, non-Johnson School students are not allowed to pre-enroll. During the first week of classes, registration of non-Johnson School students occurs on a space available basis.

UNDERGRADUATE ONLY

NBA 300 Entrepreneurship and Enterprise
Prerequisite: Introductory Accounting or equivalent, or permission of instructor.

This course provides a disciplined look at the entrepreneur and small business management. It deals with the formation and the acquisition of enterprises from the viewpoint of individuals who desire to become the principal owners. Reviews include legal and tax aspects, valuation techniques, organization forms, and venture-capital sources, as well as planning techniques necessary to launch a successful venture.

NCC COMMON CORE COURSES

NCC 500 Financial Accounting
NCC 501 Quantitative Methods for Management
NCC 502 Microeconomics for Management
NCC 503 Marketing Management
NCC 504 Behavioral and Organizational Science
NCC 505 Macroeconomics and International Trade
NCC 506 Managerial Finance
NCC 507 Management Information Systems
NCC 508 Production and Operations Management

NBA MANAGEMENT ELECTIVE COURSES

Accounting

NBA 500 Intermediate Accounting
NBA 501 Accounting for Mergers and Consolidations
NBA 502 Managerial Cost Accounting
NBA 504 Taxation Affecting Business and Personal Decision Making
NBA 505 Auditing
NBA 506 Financial Information and Evaluation
NBA 507 Federal Income Tax
NBA 508 Advanced Accounting

Economics

NBA 520 Pricing and Strategy
NBA 522 Managerial Economics
NBA 523 Business and Economic Forecasting
NBA 527 Applied Price and Theory
NBA 528 Economics of Organizations

Finance

NBA 540 Financial Policy Decisions
NBA 541 Economic Evaluation of Capital Investment Projects
NBA 542 Investment Management and Security Analysis
NBA 543 Financial Markets and Institutions
NBA 544 Bank Management
NBA 545 Corporate Finance
NBA 546 Options, Bonds, and Commodities
NBA 551 Asset Valuation
NBA 552 Case Studies in Finance
NBA 553 Financial Accounting for Manufacturing
NBA 554 International Finance

General Management

NBA 560 Business Law
NBA 561 Advanced Business Law
NBA 562 An Introduction to Estate Planning
NBA 564 Entrepreneurship and Enterprise
NBA 565 Law of Business Associations
NBA 567 Management Writing
NBA 568 Oral Communication
NBA 569 Management Consulting
NBA 575 Advanced Consulting
NBA 576 The World Geopolitical Environment of Business
NBA 577 The Political, Legal, and Regulatory Environment of Business
NBA 579 Business Strategy and Policy

International Management

NBA 580 Industrial Policy: Lessons for the United States from Japan and Europe
NBA 583 Market Transactions in Eastern Europe
NBA 584 Management of the Multinational Corporation
NBA 588 International Human Resources Management

Management Information Systems

NBA 600 Data Base Management
NBA 605 Expert Systems
NBA 606 Business Data Communications
NBA 609 MIS Policy

Marketing

NBA 620 Marketing Research
NBA 621 Advertising Management
NBA 622 Marketing Strategy
NBA 623 Models and Methods for New Products
NBA 625 International Marketing
NBA 626 Consumer Behavior
NBA 635 Marketing Models

Operations Management

NBA 641 Business Logistics Management
NBA 642 Applied Econometrics
NBA 644 Quality Management
NBA 645 Developments in Production Management
NBA 649 International Operations Management

Behavorial and Organizational Science

NBA 663 Behavioral Decision Theory
NBA 665 Managing Innovation and Technological Change
NBA 666 Negotiations

NMI AND NRE RESEARCH AND ADVANCED STUDIES

NMI 500-502 DIRECTED READINGS AND RESEARCH
NRE 502 Doctoral Seminar in Marketing
NRE 504 Doctoral Seminar in Accounting
NRE 508 Doctoral Seminar in Operations Management
NRE 509 Doctoral Seminar in Organizational Behavior
NRE 513 Doctoral Seminar in Finance
NRE 516 Incentives, Games, and Contracts
NRE 517 Negotiations and Dispute Resolution
NRE 528 Asset and Decision Making

FACULTY ROSTER

Anderson, Philip, Ph.D., Columbia U. Asst. Prof., Organizational Behavior
Bailey, Warren B., Ph.D. U. of California at Los Angeles. Asst. Prof., Finance
Bell, Nancy E., Ph.D., U. of California at Berkeley. Asst. Prof., Organizational Behavior
BenDaniel, David J., Ph.D., Massachusetts Inst. of Technology. Don and Margi Berens Professor of Entrepreneurship
Bierman, Harold, Jr., Ph.D., U. of Michigan. Nicholas H. Noyes Professor of Business Administration
Bloomfield, Robert J., Ph.D., U. of Michigan. Acting Asst. Prof., Accounting
Carr, Peter P., Ph.D., U. of California at Los Angeles. Asst. Prof., Finance
Chintagunta, Pradeep K., Ph.D., Northwestern U. Asst. Prof., Marketing
Conway, Richard W., Ph.D., Cornell U. Emerson Electric Professor of Manufacturing Management, Prof., Information Systems
DeGraba, Patrick J., Ph.D., U. of Pennsylvania. Asst. Prof., Economics
Dyckman, Thomas R., Ph.D., U. of Michigan. Ann Whitney Olin Professor of Accounting
Elliott, John A., Ph.D., Cornell U. Assoc. Prof., Accounting
Frank, Robert, Ph.D., U. of California at Berkeley. Prof., Economics
Freeman, John, Ph.D., North Carolina at Chapel Hill. Prof., Organizational Behavior
Gibbons, Robert S., Ph.D. Stanford U. Assoc. Prof., Economics
Hass, Jerome E., Ph.D., Carnegie-Mellon U. Prof., Managerial Economics and Finance
Highfield, Richard A., Ph.D., U. of Chicago. Asst. Prof., Economics
Hilton, Ronald W., Ph.D., Ohio State U. Prof., Accounting
Isen, Alice M., Ph.D., Stanford U. S. C. Johnson Professor of Marketing, Prof., Organizational Behavior, Prof., Psychology
Jaquier, Eric, Ph.D., U. of Chicago. Acting Asst. Prof., Finance
Jarrow, Robert A., Ph.D., Massachusetts Inst. of Technology. Ronald P. and Susan E. Lynch Professor of Investment Management, Prof., Finance and Economics
Kumar, Akhil, Ph.D., U. of California at Berkeley. Asst. Prof., Management Information Systems
Libby, Robert, Ph.D., U. of Illinois. David A. Thomas Professor of Management, Prof., Accounting, and Behavioral and Organizational Science
Lind, Robert C., Ph.D., Stanford U. Prof., Economics, Management, and Public Policy
McAdams, Alan K., Ph.D., Stanford U. Assoc. Prof., Managerial Economics
McClain, John O., Ph.D., Yale U. Prof., Quantitative Analysis
Malik, Kavindra, Ph.D., U. of Pennsylvania. Asst. Prof., Operations Research
Merten, Alan G., Ph.D., U. of Wisconsin. Anne and Elmer Lindseth Dean of the Johnson Graduate School of Management, Prof., Management Information Systems
Michaley, Roni, Ph.D., New York U. Asst. Prof., Finance
Nelson, Mark W., Ph.D., Ohio State U. Asst. Prof., Accounting
O'Hara, Maureen, Ph.D., Northwestern U. Assoc. Prof., Finance
Orman, Levent V., Ph.D., Northwestern U. Assoc. Prof., Information Systems
Rao, Vithala R., Ph.D., U. of Pennsylvania. Deane W. Malott Professor of Management, Prof., Marketing/Quantitative Methods
Robinson, Lawrence W., Ph.D., U. of Chicago. Asst. Prof., Operations Management
Russo, J. Edward, Ph.D., U. of Michigan. Assoc. Prof., Marketing and Behavioral Science
Smidt, Seymour, Ph.D., U. of Chicago. Nicholas H. Noyes Professor of Economics and Finance
Stayman, Douglas M., Ph.D., U. of California at Berkeley. Asst. Prof., Marketing
Thaler, Richard H., Ph.D., U. of Rochester. Henrietta Johnson Louis Professor of Management
Thomas, L. Joseph, Ph.D., Yale U. Nicholas H. Noyes Professor of Manufacturing, Operations Management
Valley, Kathleen L., Ph.D., Northwestern U. Acting Asst. Prof., Organizational Behavior
Waldman, Michael, Ph.D., U. of Pennsylvania. Prof., Economics
Wiggins, James B., Ph.D., Massachusetts Inst. of Technology. Asst. Prof. Finance
Wittink, Dick R., Ph.D., Purdue U. Prof., Marketing and Quantitative Methods

Lecturers

Curtis, Richard T., MBA, Cornell U. Part-time Lec., Finance
Katz, Jan, Ph.D., Massachusetts Inst. of Technology. Lec., International Business and Marketing
Mink, Barbara E., M.A., Cornell U. Lec., Management Communication
Pike, Alan S., M.A., Cornell U. Sr. Lec., Management Communication
Rosen, Charlotte, Ph.D., Cornell U. Sr. Lec., Coordinator, Management Communication

Adjunct and Visiting Faculty

Abowd, John M., Ph.D., U. of Chicago. Assoc. Prof., Labor Economics
Grossman, Dale A., J.D., American U. Lec., Business Law
Schuler, Richard E., Ph.D., Brown U. Prof. Economics, Prof. Civil & Environmental Engineering
Stark, David, Ph.D., Northwestern U. Assoc. Prof., Sociology
Trotman, Ken, Ph.D., Australian Grad. School of Management. Visiting Prof. Accounting

DIVISION OF NUTRITIONAL SCIENCES

ADMINISTRATION

Cutberto Garza, director

Carole Bisogni, associate director for academic affairs

Betty Lewis, graduate faculty representative, Field of Nutrition

THE DIVISION

Nutritional sciences draws upon the chemical, biological, and social sciences to understand the complex relationships among human health, nutritional status, food and lifestyle patterns, and social and institutional environments. Understanding these relationships includes the study of the metabolic regulation and function of nutrients, nutrient requirements through the life span, role of diet in reducing risk of chronic disease, nutritional quality of foods, and interventions and policies designed to promote nutritional health of individuals and populations.

The focus of this broad field of study at Cornell is the Division of Nutritional Sciences, which brings together specialists from many disciplines. The faculty are involved in undergraduate and graduate teaching, research, and extension of research-based knowledge throughout New York State, the nation, and the world.

The division is affiliated with both the College of Human Ecology and the College of Agriculture and Life Sciences. An undergraduate program in nutritional sciences is offered through the College of Human Ecology, and an undergraduate program, Nutrition, Food, and Agriculture, is offered in the College of Agriculture and Life Sciences. Graduate study is administered through the Field of Nutrition, which includes faculty members throughout the university.

FACILITIES

Most of the faculty members of the division work in Savage Hall and Martha Van Rensselaer Hall. In addition to housing offices, classrooms, and seminar rooms, those buildings contain research facilities, specialized laboratories, a human metabolic research unit, and computer facilities.

The division's Learning Resource Center in Martha Van Rensselaer Hall is used by students for individual study and small group discussions. The Learning Resources Center contains class materials, audiovisual aids, and supplementary books and periodicals for independent study and special projects in nutrition. Savage Hall also has a graduate reading room.

UNDERGRADUATE PROGRAMS

The B.S. degree programs provide students with strong training in chemistry and biology and a strong foundation in the broad field of nutritional sciences. Through the nutritional sciences major in the College of Human Ecology, students can prepare for a variety of career interests including medicine and other health careers, fitness and sports nutrition, clinical nutrition, dietetics, nutritional biochemistry, and nutrition education. The undergraduate program, Nutrition, Food and Agriculture, in the College of Agriculture and Life Sciences was established in 1990 for those students who desire strong training in human nutrition in combination with supportive course work in agriculture and the life sciences. Students in the Nutrition, Food, and Agriculture program supplement the core nutrition curriculum with courses in such areas as food science, animal science, food and agricultural economics, and advanced biology.

Every student majoring in nutrition is assigned a faculty adviser from the division. An effort is made to match interests, and students may change advisers at any time if their goals and interests change. Regular student-adviser conferences are required at least twice a year. The adviser helps students select courses to meet their interests and college graduation requirements and often can suggest opportunities for individual study or experience outside the classroom.

THE CORE CURRICULUM

The core undergraduate curriculum includes introductory chemistry and biology, organic chemistry, biochemistry, physiology, and math as well as introductory courses in the social sciences. Students complete five core courses in nutritional sciences: Nutrition and Health: Concepts and Controversies, Social Science Perspectives on Food and Nutrition, Nutritional and Physicochemical Aspects of Foods, Physiological and Biochemical Bases of Nutrition, and Methods in Nutritional Sciences. Students select a minimum of three advanced courses in nutritional sciences in the area of their interest.

A strong foundation in chemistry and biology is required. New majors, including transfer students, should plan chemistry courses carefully to assure the appropriate sequence of courses. All students who have adequate preparation in high school mathematics and chemistry are encouraged to take Chemistry 207–208. For information about specific course requirements for the nutritional sciences major in the College of Human Ecology or the Nutrition, Food, and Agriculture program in the College of Agriculture and Life Sciences, contact the division's Academic Affairs Office, 335 MVR.

CAREER OPTIONS AND COURSE PLANNING

The core curriculum is viewed as the minimum requirements for a major in nutritional sciences. Students should consult with their advisers to develop course programs that will prepare them for entry-level jobs or graduate study in the field(s) of their particular interests. Independent study involving research or field study may be chosen to enhance a course program. A summary of suggested areas from which students can choose electives for different career interests follows.

Medicine and Other Health Careers: Students add physics and calculus to the core curriculum. Nutrition courses of special interest include those focused on the relationship of nutrition to disease, behavior, growth, development, and aging. Other electives may include genetics, advanced biology, sociology, psychology, humanities, public policy, and language.

Fitness and Sports Medicine: Students can complete the Applied Exercise Science Concentration at Ithaca College which includes courses in anatomy, kinesiology, exercise physiology, and biomechanics. Nutrition courses of special interest relate to growth and development, regulation of body weight, and community nutrition and health. For information about the Applied Exercise Science Concentration, contact the DNS Academic Affairs Office, 335 MVR.

Dietetics and Clinical Nutrition: Students can complete the academic requirements for The American Dietetic Association (ADA) by adding courses in foods, nutrition and disease, microbiology, management, statistics, and nutritional care to the core curriculum. For additional information about meeting ADA requirements see Wanda Koszewski, 372 MVR.

Nutritional Biochemistry: Recommended electives include calculus, physics, genetics, advanced biology and chemistry, toxicology, and nutritional sciences courses related to the physiology, biochemistry, and metabolism of different nutrients and disease states.

Nutrition Communications and Community Nutrition: Suggested electives include courses in communications, education, human development, human service studies, public policy, and nutritional sciences courses related to community nutrition, maternal and child nutrition, geriatric nutrition, nutrition and disease, and food economics.

Consumer Foods: Recommended electives include courses in business, economics, communications, food science, microbiology, and nutritional science courses related to the physicochemical aspects of foods, management, and experimental foods.

Nutrition, Food and Agriculture: Recommended electives include food science, animal science, plant sciences, international agriculture, agricultural economics, biological sciences, and rural sociology.

FIELD EXPERIENCE

Structured field experience in a community agency, health-care facility, or business can be taken for credit in several ways through the Human Ecology Field and International Study Program as an independent study course (NS 402). Each year a limited number of senior nutrition majors intern with the Cornell Employee Wellness Program. Applications are submitted early in the spring semester of the junior year.

INDEPENDENT STUDY ELECTIVES

Independent study courses (NS 400, 401, 402) can be used to obtain credit for more diverse or intensive experience than the classroom can offer, whether this involves laboratory work, library research, or field study. Any student interested in independent study should obtain the sponsorship of a faculty adviser and the approval of Carole Bisogni or consider applying to the honors program.

HONORS PROGRAM

The honors program, leading to a B.S. degree with honors in nutritional sciences, gives official recognition to students who have demonstrated excellence in their academic work and their capacity for independent study.

In addition to fulfilling the requirements for a major, students in the honors program take courses on designing and evaluating research, complete an original piece of research, and prepare an honors thesis. The honors project may be laboratory or field research or deal with policy and program development. Animals may be used in some research studies.

For more information, students should contact Ruth Schwartz, N205 MVR.

COURSES RECOMMENDED FOR NONMAJORS

Courses in nutritional sciences can strengthen programs of study in biological sciences, biology and society, agriculture, food science, human development, human services, and other fields.

NS 115, Nutrition and Health: Concepts and Controversies, is open to all students. After NS 115, nonmajors with limited backgrounds in chemistry and biology may elect NS 222, Maternal and Child Nutrition; NS 247, Food for Contemporary Living; NS 275, Human Biology and Evolution; NS 306, Nutritional Problems of Developing Nations; NS 315, Obesity and the Regulation of Body Weight; NS 347, Human Growth and Development: Biological and Behavioral Interactions; NS 349, Geriatric Nutrition; NS 375 Developmental Psychobiology: Motivational Processes; NS 457, National and International Food Economics. Nonmajors with strong backgrounds in chemistry and the biological sciences may consider NS 331, Physiological and Biochemical Bases of Human Nutrition, as well as many advanced nutritional sciences courses, such as NS 421 Nutrition and Exercise.

GRADUATE PROGRAMS

Graduate study is administered by the Field of Nutrition, a group of more than fifty faculty members from throughout the university who have a common interest in nutritional problems. In the M.S. and Ph.D. degree programs, students may specialize in animal nutrition, human nutrition, international nutrition, nutritional biochemistry, foods, or general nutrition. Research is emphasized in all graduate programs. Field experience may be a component of concentrations in community, international and public-health nutrition, and nutrition education.

The specialties and interests represented by faculty in the Field of Nutrition provide almost unlimited opportunity for graduate study. Cornell's extensive laboratory and agricultural facilities ensure that students interested in experimental nutrition have exceptional choice and thorough training. As the largest faculty in the country devoted to the study of human nutrition, the field includes specialists in biochemical, metabolic, epidemiological, and sociocultural research. Opportunities to work with community and federal agencies are available to students interested in applied nutrition and public policy, and students in international nutrition are expected to conduct their thesis research abroad.

For more information about the graduate program, interested persons may write for the brochure Graduate Study in Nutrition, available from the Graduate Faculty Representative, Field of Nutrition, Cornell University, MVR Hall, Ithaca, New York 14853-6301; telephone (607)255-4410.

COURSES

NS 115 Nutrition and Health: Concepts and Controversies
Fall. 3 credits. S-U grades optional.
M W F 1:25. Evening prelims, times to be arranged. D. Levitsky.
Facts and fallacies concerning the role that nutrition, exercise, and other health behaviors play in preventing disease, maintaining good health, and maximizing athletic performance will be discussed. Emphasis is on understanding the biological mechanisms through which good nutrition and regular exercise affect psychological and physical health.

NS 116 Personalized Health and Nutrition
Fall. 1 credit. Corequisite: NS 115. S–U grades option. Limited 10 per section.
TBA. D. Levitsky.
This course provides students enrolled in NS 115 individualized assistance in many skills used in NS 115 including using computers to analyze diets, using electronic mail, finding and using scientific references, and reviewing material presented in NS 115 lectures.

NS 120 Contemporary Perspectives in Nutrition
Spring. 1 credit. S-U grades only.
W 12:20. G. Combs.
A series of presentations by experts from various areas of the field of nutrition involving consideration of the many types of activities of nutritionists in contemporary society, including the requisite knowledge areas and skills for those activities.

[NS 222 Maternal and Child Nutrition
Spring. 3 credits. Prerequisites: NS 115 and a college biology course or permission of the instructor. S-U grades optional. Not offered 1992–93.
M W F 1:25. V. Utermohlen.
Involves the study of nutritional requirements in pregnancy, lactation, infancy, and childhood growth through adolescence. Topics include the relationship between maternal diet and pregnancy outcome; analysis of different methods of infant feeding; and nutritional status of pregnant women, children, and adolescents in the United States and in developing countries.]

NS 245 Social Science Perspectives on Food and Nutrition
Fall. 3 credits. Prerequisite: NS 115. Limited to nutrition majors. Letter grade only.
M W F 2:30. J. Sobal, D. Sanjur.
Theories, concepts, and methods from several social science disciplines will be applied to food and nutrition topics and issues. Emphasis will be placed on theories on the formation and modification of food habits, dietary methodologies, ethnicity and food habits, and educational programs in nutrition in both national and international contexts.

NS 247 Food for Contemporary Living
Spring. 3 credits. Each section limited to 16 students. Prerequisite: NS 115. Permission of instructor during course registration required (permission-of-instructor forms must be obtained from and returned to 309 Martha Van Rensselaer Hall). Laboratory coat required. Three evening prelims to be arranged.
Lec, M 12:20; lab, T R 10:10–12:40.
G. Armbruster.
Emphasizes integration of sound nutritional practice in the scientific concepts and techniques of food preparation. Priority will be given to factors that influence meal planning, selection, and preparation of food, such as resources available; ethnic, cultural, and behavioral considerations; food presentation; sensory quality evaluation. Safe food handling practices and storage procedures included.

[NS 275 Human Biology and Evolution (also Biological Sciences 275 and Anthropology 275)
Fall. S-U grades optional, with permission of either instructor. Not offered 1992–93.
Lecs, M W F 10:10. J. D. Haas, K. A. R. Kennedy.
An introduction to the biology of Homo sapiens through an examination of human evolution, biological diversity, and modes of adaptation to past and present environments. Human diversity is examined as the product of long-term evolutionary forces and short-term adaptive responses. Topics such as creationism, scientific fraud, race and racism are discussed.]

NS 300 Special Studies for Undergraduates
Fall or spring. Prerequisites: permission of instructor. S-U grades optional.
Special arrangements to establish equivalency for courses not transferred from a previous major or institution. Students prepare a description of the study they want to undertake on a form available from the Student Services Office. The form, signed by both the instructor directing the study and the associate director for academic affairs, is filed at course registration or during the change-of-registration period.

NS 306 Nutritional Problems of Developing Nations
Spring. 3 credits. Prerequisites: NS 115. S-U grades optional.
T R 10:10–11:25. R. Martorell.
The course is designed for undergraduates interested in the nutritional problems of developing countries. Attention is given to the causes of hunger and malnutrition, the epidemiology of the major nutritional problems afflicting poor nations, the functional consequences of these problems on individuals and societies, and the types of programs that can be implemented to improve health and nutrition.

[NS 315 Obesity and the Regulation of Body Weight (also Psychology 315)
Spring. 3 credits. Prerequisites: NS 115, Psych 101. S-U grades optional. Not offered 1992–93.
T R 1:30–3. D. Levitsky.
This course is a multidisciplinary discussion of the causes, effects, and treatments of human obesity. Topics include the biopsychology of eating behavior, genetics of obesity, role of activity and energy metabolism, psychosocial determinants of obesity, anorexia nervosa, therapy and its effectiveness, and social discrimination.]

NS 331 Physiological and Biochemical Bases of Human Nutrition
Spring. 3 credits. Prerequisites: Biological Sciences 330 or 331 or equivalent. S-U grades optional.
M W F 10:10. M. Stipanuk.
The biochemical and physiological bases for human nutritional requirements, including digestion and absorption, energy metabolism, food intake regulation, lipids, carbohydrates, protein and amino acids, minerals, vitamins, and relationship of nutrition to major chronic diseases.

NS 332 Methods in Nutritional Sciences
Spring. 3 credits. Each section limited to 18 students. Prerequisites: NS 245, NS 345, NS 331 or concurrent registration and permission of instructor during course registration (permission-of-instructor forms must be obtained from and returned to 309 Martha Van Rensselaer Hall). Two evening prelims to be scheduled. Lab fee $25.00.
Lec, M 12:20; labs, M W 1:25–4 or T R 8:15–10:45 or T R 1:25–4. K. Rasmussen, J. T. Brenna.
Laboratory introduction to principles and analytical techniques of nutritional research. Emphasis is on analytical skills required to determine nutrient function and nutritional status of individuals. Topics include methods of nutrient, metabolite, and enzyme analysis in body fluids and methods for assessing individual food intake and nutritional status.

NS 345 Nutritional and Physicalchemical Aspects of Food
Spring. 3 credits. Prerequisite: college course in organic chemistry or biochemistry. S–U grades optional.
T R 2–3:15. B. Lewis, R. Parker.
A study of the nutritional, physical and chemical properties of foods including composition, food structure, enzymic and nonenzymic phenomena, and processing/preparation aspects. Issues related to food safety, regulation, and food composition data bases will also be discussed.

NS 346 Introduction to Physicalchemical Aspects of Food—Laboratory
Spring. 2 credits. Each section limited to 18 students. Prerequisites: NS 345 or concurrent registration and a college course in organic chemistry. S-U grades optional.
M W 2–4:25. B. Lewis, R. Parker.
Laboratory exercises designed to illustrate principles related to food quality and ingredient functionality and to introduce students to the analytical methodology associated with food evaluation.

NS 347 Human Growth and Development: Biological and Behavioral Interactions (also Human Development and Family Studies 347 and Biology and Sociology 347 and Biology and Society 347)
Spring. 3 credits. Prerequisites: Biological Sciences 101 or 109 or equivalent; Human Development and Family Studies 115 or Psychology 101 or equivalent. Offered alternate years.
M W F 1:25. J. Haas, S. Robertson.
This course is concerned with the interrelationships between physical and psychological growth and development in humans, particularly during infancy. Intrinsic and extrinsic causes of variations in growth, including various forms of stimulation, are considered. In addition, the consequences of early growth and its variations for current and subsequent behavioral, psychological, and physical development are examined. The interaction between physical and behavioral or psychological factors is emphasized throughout the course.

NS 349 Geriatric Nutrition
Fall. 3 credits. Prerequisites: NS 115.
M W F 10:10. D. Roe.
Aims of the course are to acquaint students with effects of aging on nutritional needs; to teach them methods of nutritional assessment that are appropriate for use with the elderly; and to give them information on nutritional interventions that have been shown to have positive effects on the nutritional and health status of older individuals.

NS 361 Biology of Normal and Abnormal Behavior
Fall. 3 credits. Prerequisites: Biological Sciences 101–102, Psychology 101, or permission of the instructor. A fundamental knowledge of biology and psychology is essential. S-U grades optional. Limited to juniors and seniors.
M W F 9:05. B. Strupp.
A critical evaluation of biological factors thought to influence behavior and/or cognitive functioning. Biological, psychological, and societal influences will be integrated. Topics include nutrition and behavior, psychiatric disorders, developmental exposure to environmental toxics and drugs of abuse, and biopsychology of learning, memory, intelligence, and related cognitive disorders.

NS 375 Developmental Psychobiology: Motivational Processes
Spring. 3 credits.
T R 10:10. E. Blass.
This course examines the principles of behavioral development in mammals. The approach focuses on behavioral ecology by identifying demands that animals must satisfy during development and the resources that are used in so doing. Among these demands are food, water, shelter and warmth.

NS 378 Food, Nutrition, and Service Management
Fall. 3 credits. Prerequisites: NS 247 or permission of instructor. S-U grades optional.
M W 2:30–3:45. P. Tennant.
Applications of organization and management principles and theory to foodservice organizations, operations, and nutrition services. Emphasis is placed on leadership development, decision making/problem solving; procurement, production, distribution and quality assurance in food and nutrition services; human resource management; and financial planning in food and nutrition services. Other experiences may be possible in community foodservice operations.

NS 398 Honors in Nutritional Sciences
Fall. 1 credit. Limited to students admitted to the division honors program. S-U grades only.
TBA. Division faculty.
Research design. Analysis of research papers on selected topics.

NS 400–401–402–403 Special Studies for Undergraduates
Fall or spring. Credits to be arranged. S-U grades optional.
Division faculty.
For advanced independent study by an individual student or for study on an experimental basis with a group of students in a field of nutritional sciences not otherwise provided through course work in the division or elsewhere at the university. Students prepare a description of the study they want to undertake on a form to be signed by the instructor directing the study and the associate director for academic affairs. The form, available from the Student Services Office, is filed at course registration or within the change-of-registration period. To ensure review before the close of the course registration or change-of-registration period, students should submit the special-studies form to the associate director for academic affairs as early as possible.

NS 400 Directed Readings
For study that predominantly involves library research and independent reading.

NS 401 Empirical Research
For study that predominantly involves data collection and analysis or laboratory or studio projects.

NS 402 Supervised Fieldwork
For study that involves both responsible participation in a community setting and reflection on that experience through discussion, reading, and writing. Academic credit is awarded for this integration of theory and practice.

NS 403 Teaching Apprenticeship
For study that includes assisting faculty with instruction.

NS 421 Nutrition and Exercise
Spring. 3 credits. Prerequisites: Bio S 330 or 331, Bio S 311 and NS 115 or NS 331. S–U grades optional.
M W F 11:15. W. Koszewski.
This course will acquaint students with the interaction between nutrition, exercise, and athletic performance. Topics will cover the biological, psychological, and sociological aspects of nutrition in exercise performance. Students will learn nutritional counseling techniques in educating the recreational and professional athlete, coach, and trainer.

NS 441 Nutrition and Disease
Fall. 4 credits. Prerequisites: NS 331 and a human physiology course. S-U grades optional.
M W F 10:10 and F 8. V. Utermohlen.
Study of the physiologic and metabolic anomalies in chronic and acute illnesses and the principles of nutritional therapy and prevention. The topics covered include diabetes mellitus, starvation, obesity, nutritional assessment, nutritional pharmacology, severe injury, infection, cancer, gastrointestinal diseases, liver disorders, renal diseases, cardiovascular diseases, and pediatrics.

NS 442 Implementation of Nutrition Care
Fall. 3 credits. Limited enrollment. Prerequisites: NS 247, concurrent registration in NS 441 (or equivalent background in either course), and permission of instructor during course registration. (Permission-of-instructor forms must be obtained from and returned to 309 Martha Van Rensselaer Hall.) S-U grades optional.
Lec, M W 9:05; lab 1 T 2:30–4:20, lab 2 R 11:15–1:10. W. Koszewski.
Development of skills necessary to implement nutrition care plans: interviewing and counseling, dietary assessment, calculation of therapeutic diets and menu planning, and quality assurance are covered.

NS 446 Physiochemical Aspects of Food
Spring. 3 credits. Prerequisite: biochemistry, which may be taken concurrently. S-U grades optional.
M W F 9:05. G. Armbruster.
The relation of food quality to (a) rheological properties of food systems, (b) oxidation and reduction reactions, and (c) enzymatic and nonenzymatic browning. Covers physical and chemical factors accounting for the color, flavor, and texture of natural and processed foods.

NS 447 Physiochemical Aspects of Food—Laboratory
Spring. 1 credit. Prerequisite: NS 446 or concurrent registration. S-U grades optional.
M 1:25–4:25. G. Armbruster.
Laboratory experiments designed to illustrate the effect of varying ingredients and treatment on the quality of food products. Objective testing methods are used to determine food quality characteristics.

NS 448 Physiochemical Aspects of Food—Laboratory
Spring. 1 credit. Prerequisite: NS 446 or concurrent registration. S-U grades optional.
W 1:25–4:25. G. Armbruster.
Laboratory experiments designed to illustrate (a) the physiochemical behavior of colloidal systems, (b) chemical reactions of some food components, and (c) effects of temperature, pH, moisture, inorganic salts, and enzymes on physiochemical changes in natural foods, food components, and food mixtures.

NS 456 Experimental Foods Methods
Spring. 3 credits. Prerequisites: NS 446, 447 and/or 448.
Labs, T R 1:25–4:25. G. Armbruster.
Application of the scientific method in the design and performance of experimental food problems and the interpretation and evaluation of results. Evaluation of the use of instruments and chemical and sensory methods in the measurement of food properties. Independent problems.

NS 457 National and International Food Economics (also Economics 374)
Spring. 3 credits. Prerequisites: Econ 101 or CEH 110 and junior standing, or permission of instructor. S-U grades optional.
M W F 9:05. E. Thorbecke.
Analysis of the world food economy. Review and analysis of the major economic factors determining the demand for food, the composition of food consumption, and nutritional intake; and the major economic factors affecting food production and supply. Evaluation of effectiveness of various policies and programs in alleviating poverty and malnutrition.

NS 488 Applied Dietetics in Foodservice Systems
Spring. 3 credits. Limited to 30 students. Prerequisites: NS 378, Applied Microbiology, and permission of instructor (permission-of-instructor forms must be obtained from and returned to 309 Martha Van Rensselaer Hall). S-U grades optional. Uniform required.
Lec, M W 9:05; lab, M, T, or W 1:30–6. P. Tennant.
Students will gain experience in care and use of institutional equipment, menu planning, recipe development, job analysis and evaluation, volume food production, applied sanitation, in-service training, and other skills required to operate/manage a foodservice program. Some laboratories will be arranged through Cornell Dining.

NS 498 Honors in Nutritional Sciences
Spring. 1 credit. Limited to students admitted to the division honors program. Students may register in NS NS 499 concurrently.
TBA. Division faculty.
Informal presentation and discussion of current topics in food and nutrition in which all members participate. Written reports on topics discussed may be requested. Delineation of honors research problems in consultation with faculty adviser.

NS 499 Honors Problem
Fall and spring. Credits to be arranged. Open only to students in the division honors program.
TBA. Division faculty.
An independent literature, laboratory, or field investigation. Students should plan to spread the work over two semesters.

NS 600 Special Problems for Graduate Students
Fall or spring. Credit to be arranged. Limited to graduate students recommended by their chair and approved by the instructor in charge. S-U grades optional.
Hours to be arranged. Division faculty.
Emphasis on independent advanced work. Experience in research laboratories in the division may be arranged.

NS 601 Proteins and Amino Acids (also Animal Science 601)
Spring. 2 credits. Prerequisites: physiology, biochemistry, and nutrition, or permission of instructor. Letter grade only. Offered even-numbered years.
W F 12:20. R. E. Austic.
A course in amino acid and protein nutrition, with emphasis on the dynamic aspects of protein digestion, amino acid transport, and amino acid and nitrogen metabolism. Topics also will include nutritional interrelationships of amino acids, amino acid availability and requirements, and the roles of amino acids in selected physiological processes.

NS 602 Lipids
Fall. 2 credits.
T R 11:15. A. Bensadoun.
Advanced course on biochemical, metabolic, and nutritional aspects of lipids. Emphasis is on critical analysis of current topics of lipid methodology, lipid absorption, lipoprotein secretion, structure, and catabolism; molecular biology of lipoproteins and their receptors; mechanisms of hormonal regulation of lipolysis and fatty acid synthesis; and cholesterol metabolism and atherosclerosis.

NS 604 The Vitamins
Fall. 2 credits.
T R 10:10. G. F. Combs, Jr.
Discussion sessions on nutritional aspects of the vitamins, including recent developments in nutritional and biochemical interrelationships with other nutrients and metabolites.

[NS 611 Molecular Toxicology (also Toxicology 611)
Spring. 2 credits. Prerequisite: Toxicology 610 and a full-year 400-level course in biochemistry or equivalent. S-U grades optional. Offered alternate years. Not offered 1992–93.
Hours to be arranged. Staff.
A study of fundamental biochemical mechanisms of absorption, transport, metabolism, and excretion of drugs, carcinogens, and toxicants. Emphasis on oxidative and conjugative pathways of metabolism and of environmental and nutritional factors that influence toxicant metabolism and disposition. Methods of evaluating in vivo and in vitro metabolism.]

NS 612 Methods of Assessing Physical Growth in Children
Spring. 3 credits. Limited to graduate students and students who have permission of the instructor. A previous course in statistics required. S-U grades optional.
Lec, T 1:25; lab, R 1:25–4:25; disc, T 2:15–3:05. J. Haas.
A laboratory course to train students in methods and techniques used to assess the physical growth and development of children. The methods explored are those applicable for field or community studies and cover anthropometry, body composition, skeletal age, maturity indicators, physical fitness, and energy expenditure.

NS 614 Topics in Maternal and Child Nutrition
Fall. 3 credits. Prerequisites: NS 331, and 222 or 347, Biological Sciences 311, and permission of instructor.
T R 9:05–10:30. K. Rasmussen.
Advanced course on the role of nutrition during pregnancy and lactation. Feeding and growth of infants and children in health and disease is considered. Critical evaluation of current literature is emphasized.

NS 616 Readings in Food
Fall. 2 credits. Prerequisite: organic chemistry. Recommended: biochemistry. S-U grades optional. May be repeated for credit with permission of instructor.
W 7:30–9:25 p.m. N. Mondy.
Critical review of current literature. Emphasis on experimental data and scientific principles underlying modern theory and practice relative to food quality. Training in oral and written presentation of scientific information.

NS 617 Teaching Seminar
Fall or spring, first half of semester. 0 credit. Limited to division graduate students and students who have permission of the instructor. S–U only.

Hours to be arranged. C. Bisogni, D. Way.
A series of workshops focusing on development of teaching skills for guiding classroom learning in lecture, discussion, and laboratory settings. Preparation of content, presentation, and interaction techniques and evaluative methods are emphasized in relation to the student's specific teaching assignment. Videotape simulations provide opportunity for practice and analysis of teaching behaviors.

NS 618 Teaching Experience
Fall or spring. 0 credit. Limited to division graduate students and students who have permission of instructor. S–U only.

Hours to be arranged. Division faculty; C. Bisogni, coordinator.
Designed to provide experience in teaching nutritional sciences by direct involvement in college courses under supervision of a faculty member. The aspects of teaching and the degree of involvement vary, depending on the needs of the course and the experience of the student.

NS 619 Field of Nutrition Seminar (also Animal Science 619)
Fall or spring. 0 credit. S–U only.

M 4. Faculty and guest lecturers.
Lectures on current research in nutrition.

[NS 620 Food Carbohydrates (also Food Science 620)
Spring. 2 credits. Prerequisites: Biological Sciences 330 or equivalent. Letter grades only. Offered alternate years; not offered 1992–93.

T R 10:10. J. Brady, B. Lewis.
A consideration of the chemistry of carbohydrates, including sugars and complex carbohydrates (starches, pectins, hemicelluloses, gums, cellulose, and conjugated carbohydrates). Emphasis is on intrinsic chemistry, functionality in food systems, and changes occurring during food processing and storage.]

NS 626 Special Topics in Food
Spring. 2 credits.

Hours to be arranged. G. Armbruster, B. Lewis.
Current research related to food is reviewed in the context of basic principles and their application to the quality of food.

NS 627 Special Topics in Food
Spring. 2 credits. Prerequisite: organic chemistry. Recommended: biochemistry. S-U grades optional. May be repeated for credit with permission of instructor.

W 7:30–9:30 p.m. N. Mondy.
Current research related to international food. The effect of postharvest, storage, and processing on the nutritive value and naturally occurring toxicants in the food chain.

NS 630 Anthropometric Assessment
Spring, weeks 3–5. 1 credit. Prerequisites: NS 331 or equivalent and permission of instructor.

T 2:30–5:30, S 9–12. J. Haas.
Overview of methods of assessing nutritional and health status, techniques of anthropometry, body composition, energy expenditure and physical performance applicable to children and adults.

[NS 631 Dietary Assessment
Fall. 1 credit. 7 weeks only. Prerequisites: statistics and NS 331 or equivalent. Enrollment limited. Not offered 1992–93.

R 2:30–5:30. D. Sanjur.
Study of methods and techniques for assessing dietary intakes at the individual and household levels.]

NS 632 Clinical Assessment
Spring. 1 credit. Prerequisites: NS 441, 630, 631, and Biological Sciences 330 or 331; NS 332 or Biological Sciences 430; and permission of instructor.

T R 2:30–5:30. V. Utermohlen and division faculty.
Study of methods and techniques for clinical assessment of nutritional status and diagnosis of nutritional disorders.

NS 633 Human Metabolic Studies
Spring. 1 credit. Prerequisite: NS 331. Limited to 20 students. S-U grades optional.

Hours to be arranged; 6 meetings over a 3-week period, 2-1/2 hours each. D. Roe.
Lectures cover planning and writing a study protocol; selecting an experimental design; selecting subjects; designing, preparing, analyzing diets; how to make collections; how to examine data for subject period and treatment effects. Students will participate in a 6-day study.

NS 635 Mechanisms of Metabolic Regulation (also Biological Sciences 635)
Spring. 2 credits. Prerequisites: Chemistry 358 or 360 and either Biological Sciences 330 or 331 or permission of instructor. Offered alternate years. Not offered 1993–94.

T R 9:05. Division faculty.
Lectures only. The identification and characterization of regulatory steps in metabolism are considered from both theoretical and practical aspects. The intracellular mechanisms of regulation are stressed, with specific examples examined in detail.

NS 636 Integration and Coordination of Energy Metabolism(also Biological Sciences 637)
Fall. 3 credits. Prerequisites: Biological Sciences 330 and 331, or equivalent.

M W F 9:05. W. J. Arion.
The dynamics of energy metabolism in humans and higher animals are developed through characterizations of how the metabolic components support the structure and function of the individual tissues. Mechanisms that control and coordinate energy metabolism within and between organs are analyzed in the context of selected physiological and pathological stresses.

NS 637 Epidemiology of Nutrition
Spring. 3 credits. Taught in conjunction with Advanced Epidemiology (Vet Med 665). Limited to graduate students. Prerequisites: Statistics and Biometry 602 or 604 or equivalent, NS 331 or equivalent, Vet Med 664 or equivalent.

Hours to be announced. J.-P. Habicht.
Course covers principles of nutritional epidemiology, impact assessment of nutrition intervention programs, and nutritional surveillance. Teaching principles of using nutritional information for decision making, including the levels of evidence about nutrition and health for making decisions. The course shows how the biochemistry and physiology of nutrition can be related to epidemiological assessment and research strategies.

NS 638 Epidemiology of Nutrition Seminar
Spring. 3 credits. Reserved for graduate students planning field intervention studies; by permission of instructor. Prerequisite: NS 637.

Hours to be announced. J.-P. Habicht.
Covers the meta-analysis, design, measurement, and analytic issues involved in developing, implementing, and analyzing studies of field interventions with nutritional impact.

NS 639 Epidemiology Seminar (also Statistics and Biometry 639)
Fall and spring. 0–1 credit. Limited to graduate students; others by permission of instructor. S-U grades only.

Hours to be announced. J.-P. Habicht, H. Erb.
This course will develop skills in the preparation and interpretation of epidemiological data by discussing current research topics and issues.

NS 640 Social Science Theories in Nutrition
Fall. 3 credits. Limited to 20 graduate students.

M W F 2:30 (first 7 weeks), W 3:30–5:10 (all semester). J. Sobal.
Social science theories from psychology, sociology, anthropology, economics, political science, geography, and history that contribute to understanding food and nutrition will be examined. Examples of approaches, concepts, and methods from each discipline will be added to understand how to apply social science theories to nutrition topics, issues, and problems.

NS 641 Applied Regression Methods in Nutrition and Human Ecology
Spring. 3 credits. Prerequisite: Stats 601 or equivalent.

M W F 11:15. E. Frongillo.
Second statistics course intended for graduate students who need to apply regression methodology in nutrition, health, human services, human development, or program intervention. The course covers the conceptual and statistical aspects of regression models for continuous, discrete, and time-to-event response variables with multiple covariates. Interpretation of parameters, confounding and interaction, and assessing fit are emphasized. An introduction to modeling complex observational data with multiple response variables is presented.

NS 644 Community Nutrition Research Seminar
Fall and spring. 0 credit. S–U only.

M 11:15. Division faculty.
This seminar series focuses on research presentations in nutrition education and other areas of community nutrition. Cornell faculty and graduate students and outside invited speakers present research proposals, results from ongoing research, theoretical bases for research, program evaluations, and discuss current issues in community nutrition research. The format varies but always includes discussion by participants.

NS 645 Nutrition Intervention in Communities: A Global Perspective
Spring. 3 credits. Limited to 25 graduate students with an interest in human nutrition and health and exceptional senior nutrition majors by permission.
T R 8:40–9:55. C. Olson and nutrition intervention and policy faculty.
The goal of the course is to help students gain tools and develop conceptual frameworks for thinking critically about nutrition interventions in communities around the world. The course involves extensive reading and active involvement in class discussions on selected topics.

NS 646 Seminar in Physicochemical Aspects of Food
Spring. 1–3 credits. Prerequisite: a college course in organic chemistry or biochemistry. S-U grades optional.
T R 2–3:15; disc to be arranged. B. Lewis, R. Parker.
An introduction to physicochemical aspects of food, for graduate students who have had limited or no work in this area. The seminar uses the lectures of NS 345 as a basis for supplementary readings and critical review of research on selected topics.

NS 650 Public Health Nutrition
Spring. 3 credits. For graduate students with a major or minor in nutrition and undergraduate nutrition majors in their senior year. Prerequisite: NS 331 or equivalent.
M W F 9:05. D. Roe.
Lectures cover social, environmental, and disease variables that influence the nutrition of infants, children, and adults. Students gain experience in nutritional assessment methods. Endemic nutritional problems (such as obesity, dental caries, and anemias) of public health importance of the United States are discussed. Student presentations are made in class. Field experience is offered.

NS 651 Nutrition and the Chemical Environment (also Toxicology 651)
Fall. 3 credits. Prerequisite: NS 331 or equivalent. S-U grades optional.
M W F 11:15. D. Roe.
An overview of interactions between drugs and nutrients is presented. Specific lecture topics include food-drug incompatibilities, drug-induced nutritional deficiencies, and nutritional teratology. Students will obtain methods skills in selection of animal models, in nutritional pharmacology, and in research designs appropriate to human studies.

NS 659 The Nutrition, Physiology, and Biochemistry of Mineral Elements (also Veterinary Medicine 759 and Biological Science 615)
Spring (first 7 weeks). 2 credits. Prerequisites: basic physiology, intermediate biochemistry, and general nutrition.
T R 3–4:40. R. Schwartz, R. H. Wasserman, and C. C. McCormick.
The objective of this course is to provide students with an insight into the fundamental concepts of mineral nutrition and to highlight the unique aspects of minerals as nutrients. Lectures and discussions focus on absorption, transport, homeostasis, function, essentiality, toxicity, and requirements of key minerals.

NS 660 Special Topics in Nutrition
Fall or spring. 3 credits maximum each term. Registration by permission of the instructor.
Hours to be arranged. Division faculty.
Designed for students who want to become informed in any specific topic related directly or indirectly to nutrition. The course may include individual tutorial study, experience in research laboratories, a lecture series on a special topic selected by a professor or a group of students, and/or selected lectures of another course already offered. Topics may be changed so that the course may be repeated for credit.

NS 669 Field Seminar on Nutrition in Government
Spring. 1 credit. Limited to 15 students. S-U grades only.
V. Utermohlen.
This 2–3 day seminar provides an overview of policy decision making and implementation of nutrition programs at the national level in Washington, D.C. Provides opportunities to meet and confer with staff members of the legislature and selected government and private agencies. An orientation meeting and follow-up group discussion and summary report are also part of this seminar. Supplemental fee required.

NS 680 International Nutrition Problems, Policy and Programs
Fall. 3 credits. Prerequisite: permission of instructor.
T R 11:15–12:30. M. Latham.
Designed for graduate students who want to learn about the important nutritional problems of developing countries. The major forms of malnutrition related to poverty and their underlying causes are discussed. Emphasis is placed on programs and policies that can assist poor countries and communities to improve their nutritional and health status.

NS 681 Nutritional and Public Health Importance of Human Parasitic Infections
Fall. 2 credits. Prerequisites: graduate student status or permission of instructor. S-U grades optional. Offered alternate years. Not offered 1993–94.
M 2:30–4:15. L. Stephenson and staff.
Reviews the scientific evidence for relationships between human nutritional status and common human parasitic infections. Concentrates on malnutrition (protein-energy malnutrition, anemia) in developing countries. Parasitic infections emphasized are malaria, hookworm, ascaris, schistosomiasis, and trichuriasis. Format is lecture-discussion.

NS 683 Field Studies in International/ Community Nutrition
Fall. 1 credit. Graduate student status or permission of instructor required. Strongly recommended for graduate students doing field research. S-U grades only.
Hours to be arranged; 12 class hours on 3 Saturdays. L. Stephenson.
Reviews practical considerations in conducting field research in developing countries, including (1) seeking fundings, (2) experimental design issues, (3) choice of procedures, and (4) planning for and carrying out data collection. Also includes how to a) construct a C.V., b) write an abstract and prepare a clear 10-minute talk with legible slides (FASEB formation), and c) when, where, and how to publish research results. Extensive handouts. Lecture/demonstration/discussion.

NS 685 Food and Nutrition Policy (also Agricultural Economics 685)
Fall. 3 credits. Prerequisites: Consumer Economics and Housing 310 or Consumer Economics and Housing 603 or Economics 311 or 313 or Agricultural Economics 415 or equivalent. Knowledge of multiple regression. S-U grades optional.
M W 1:15–2:25.
The course will identify the principal links between human nutrition and government action, with emphasis on developing countries. The process of policy formation, including economic and political factors, will be discussed. The role of nutrition information and surveillance in policy design, implementation, and evaluation will be analyzed along with methodologies for empirical analysis of food and nutrition policy.

[NS 690 Advanced Analytical Chemistry III: Trace Elements and Isotopic Analysis (also Chemistry 628)
Spring. 3 credits. Primarily for graduate students. Prerequisite: Chemistry 288 or 390, or Chemistry 208 and Physics 102 and Mathematics 112, or permission of instructor. Offered alternate years. Not offered 1992–93.]

NS 698 International Nutrition Seminar
Fall and spring. No credit. No grades given.
R 12:20–1:10. M. Latham.
This seminar series consists of presentations by Cornell faculty and graduate students, and by outside invited speakers. Speakers cover a range of topics which relate to nutritional problems, policy, and programs in the non-industrialized countries.

NS 699 Special Topics in International Nutrition
Fall and spring. 3 credits maximum each term. Registration by permission of instructor.
M. Latham and faculty in Program in International Nutrition.
This option is designed for graduate students, mainly those with a concentration in international nutrition, who wish to become familiar with some specific topic related to international nutrition that is not adequately covered in an existing course. It consists usually of tutorial study on an agreed topic. Because the topics change, the course may be repeated for credit.

NS 700 Current Topics in Toxicology (also Toxicology 698)
Fall or spring. 1–3 credits. S-U grades optional.
Hours to be arranged. Staff.
A discussion of the most current developments in various areas of toxicological research and testing. Faculty and students will participate jointly in evaluating research findings and provide seminars and discussion of such material. For information regarding topic, instructor, and credit, contact the office of the Graduate Field of Environmental Toxicology.

NS 702 Seminar in Toxicology (also Toxicology 702)
Fall or spring. 1 credit. S-U grades only.
F 12:20. Staff.
The seminar program covers varied topics in biochemical, genetic, nutritional, veterinary, and regulatory toxicology, ecotoxicology, and environmental chemistry. Included are presentations of basic research studies, fundamental concepts, and research activities involving environmental problems of a toxicological nature. Presentations are given by speakers from Cornell and visitors.

NS 703 Seminar in Nutritional Science
Fall and spring. 1 credit. S-U grades only.
T 12:20 or W 12:20. Division faculty.
Presentations of original articles pertinent to the Nutritional Sciences. Students will learn how to make professional presentations and how to critique the presentations by others. In addition, students will learn how to read and interpret original articles published in a wide variety of journals.

NS 899 Master's Thesis and Research
Fall or spring. Credit to be arranged.
Prerequisite: permission of the chair of the graduate committee and the instructor. S-U grades optional.
Hours to be arranged. Division graduate faculty.

NS 999 Doctoral Thesis and Research
Fall or spring. Credit to be arranged.
Prerequisite: permission of the chair of the graduate committee and the instructor. S-U grades optional.
Hours to be arranged. Division graduate faculty.

FACULTY ROSTER

Arion, William J., Ph.D., U. of N. Dakota. Prof.
Armbruster, Gertrude, Ph.D., Washington State U. Assoc. Prof.
Bensadoun, Andre, Ph.D., Cornell U. Prof., Nutritional Sciences/Physiology
Bisogni, Carole, Ph.D., Cornell U. Assoc. Prof. and Associate Director for Academic Affairs
Brenna, Thomas, Ph.D., Cornell U. Asst. Prof.
Brink, Muriel, M.S., Michigan State U. Prof.
Campbell, T. Colin, Ph.D., Cornell U. Jacob Gould Schurman Professor of Nutritional Biochemistry
Chen, Junshi, M.D., Peking Medical College, China. Adjunct Prof.
Combs, Gerald F. Jr., Ph.D. Cornell U. Prof.
Cowell, Catherine, M.S., U. of Connecticut. Adjunct Prof.
Crompton, D. W. T., Ph.D., Sc.D., U. of Cambridge (England). Adjunct Prof.
Garza, Cutberto, M.D., Baylor College; Ph.D., MIT. Director and Prof.
Gillespie, Ardyth, Ph.D., Iowa State U. Prof.
Haas, Jere D., Ph.D., Pennsylvania State U. Prof.
Habicht, Jean-Pierre, Ph.D., Massachusetts Inst. of Technology. James Jamison Professor of Nutritional Epidemiology
Kazarinoff, Michael N., Ph.D., Cornell U. Assoc. Prof., Nutritional Sciences/Biochemistry, Molecular and Cell Biology
Latham, Michael C., D.T.M.&H., U. of London (England). Prof.
Levitsky, David A., Ph.D., Rutgers U. Assoc. Prof.
Lewis, Bertha A., Ph.D., U. of Minnesota. Assoc. Prof.
Martorell, Reynaldo, Ph.D., U. of Washington. Prof.
McCormick, Charles, Ph.D., North Carolina St. U. Assoc. Prof.
Mondy, Nell I., Ph.D., Cornell U. Prof.
Nesheim, Malden C., Ph.D., Cornell U. Prof.
Olson, Christine M., Ph.D., U. of Wisconsin. Prof.
Parker, Robert S., Ph.D., Oregon State U. Assoc. Prof.
Pearson, Thomas, Ph.D., Johns Hopkins U. Adjunct Prof.
Rasmussen, Kathleen M., Sc.D., Harvard U. Assoc. Prof.
Rivera, Juan, Ph.D., Cornell U. Adjunct Asst. Prof.
Rivlin, Richard S., M.D., U. of London (England). Prof.
Roe, Daphne A., M.D., U. of London (England). Prof.
Sanjur, Diva M., Ph.D., Cornell U. Prof.
Schwartz, Ruth A., Ph.D., U. of London (England). Prof.
Sobal, Jeffery, Ph.D., U. of Pennsylvania. Assoc. Prof.
Stephenson, Lani, Ph.D., Cornell U. Assoc. Prof.
Stipanuk, Martha H., Ph.D., U. of Wisconsin. Assoc. Prof.
Thorbecke, Erik, Ph.D., U. of California. H. E. Babcock Professor of Economics and Food Economics
Utermohlen, Virginia, M.D., Columbia U. Assoc. Prof., Nutritional Sciences/Biochemistry, Molecular and Cell Biology

Other Teaching Personnel

Koszewski, Wanda, Ph.D., Kansas St. U. Lecturer
Strupp, Barbara, Ph.D., Cornell University. Lecturer
Tennant, Priscilla, M.Sc.Ed., SUNY Cortland, Lecturer

Joint Appointees

Apgar, B. Jean, Visiting Assoc. Prof., U.S. Plant, Soil, and Nutrition Laboratory/ Nutritional Sciences
Bauman, Dale, Prof., Animal Science/ Nutritional Sciences
Blass, Elliot, Prof., Psychology/Nutritional Sciences
Miller, Dennis, Prof., Food Science/Nutritional Sciences
Van Campen, Darrell R., Assoc. Prof., U.S. Plant, Soil, and Nutrition Laboratory/ Nutritional Sciences
VanSoest, Peter J., Prof., Animal Science/ Nutritional Sciences

OFFICER EDUCATION

Military instruction began at Cornell University in 1868 under the provisions of the Morrill Act of 1862. Since that time, officer education has been highlighted by the construction of Barton Hall in 1914, establishment of a formal Reserve Officers Training Corps (ROTC) unit in 1917, and the evolution of a program that, while teaching drill and ceremonies, places greater emphasis on the development of leadership and managerial skills. Throughout the years, Cornell's program of officer education has produced many outstanding civilian and military leaders.

The programs of officer education allow the student to prepare for a commission as an officer in either the United States Army, Navy, Air Force, or Marine Corps. Each service program is headed by a senior military officer who also serves as a full professor on the Cornell faculty.

MILITARY SCIENCE

Lieutenant Colonel John L. Shirk, Quartermaster Corps, United States Army, Professor of Military Science and Commanding Officer, U.S. Army ROTC Instructor Group

Major Keith W. Kuberek, Infantry, United States Army

Captain Steven L. Jones, Quartermaster Corps, United States Army

Captain Jacqueline R. Grano, Adjutant General Corps, United States Army National Guard

United States Army ROTC Program

The primary objective of the Army Officer Education Program at Cornell is to commission the officer leadership of the United States Army. Intermediate objectives are to provide students with an understanding of the fundamentals of responsibility, integrity, and self-discipline, as well as an appreciation of the citizen's role in national defense. The application of the decision-making process to a variety of situations is given major emphasis as a valuable aid in developing leadership potential.

These objectives are achieved through a program normally covering four years. A two-year program is available for those who qualify. The program includes specific courses in military science, more general academic subjects that assure a well-rounded education, practical training in leadership through participation in the Cadet Corps (including attendance at one six-week summer camp at an Army installation), and the opportunity to participate in a number of extracurricular activities. The combination prepares the student for commissioning and effective performance in the many branches of the Army. The student's academic major, academic performance, leadership ability, personal desires, and the needs of the Army determine the branch of the Army in which he or she is commissioned upon graduation.

Requirements for Enrolling

Applicants must be citizens of the United States (Noncitizens may enroll in selected portions of the program.) Students must meet Army medical requirements.

Overall sound mental and physical condition is essential, and students are required to undergo periodic physical fitness tests. Enrollment and continuation in the program is subject to the approval of the professor of military science.

Enrollment in specific courses by students not formally enrolled in the program must be approved by course instructors.

Four-Year Program

The Four-Year Program is open to students in their freshman year or, with the approval of military and university authorities, to sophomores in a five-year degree program. Veterans of the Armed Forces of the United States and students entering Cornell with AROTC credit from secondary or military schools (Junior Division AROTC) may receive advanced standing.

Under the Four-Year Program students enroll in the Basic Course (Mil S I and II) during the first two years, and the Advanced Course (Mil S III and IV) during the next two years. A total of twelve credits of military subjects is taken. In addition, academic-enrichment courses are required in such fields as written communications, math logic, computer science, human behavior, military history, and perhaps a foreign language. All cadets attend a six-week camp, with pay, between the junior and senior years. All cadets participate in physical fitness training three mornings per week.

Basic Course (Mil S I and Mil S II)

Students in the first year of the Basic Course take one classroom course in military science in the fall and spring semesters, for which they receive academic credit depending upon their college. These courses include study of the U.S. organization for defense and principles and techniques of leadership and management.

Students also participate in leadership modules that include rappelling, orienteering, drill and ceremony, physical training, winter survival, and individual tactical training. These modules are designed to promote personal development and enrichment. While they do not receive academic credit for these activities, students receive physical education credit. Typical freshman participation in Army officer education is 48 1/2 program-related hours.

During the fall of the second year, students take a one-credit course in map reading and spend approximately two hours a week in practical leadership training, land navigation, and military skills. In the spring, students take a one-credit course in the basic principles of small organizations.

Advanced Course (Mil S III and Mil S IV)

The Advanced Course of the Four-Year Program is open to students who have successfully completed the Basic Course and are accepted by the Professor of Military Science for further enrollment. It is also open to students who have gained appropriate advanced standing through either successful completion of a six-week summer camp or prior military training. Students entering the Advanced Course must have two years of academic work remaining at Cornell or another degree-granting institution. Students must pass such physical and aptitude tests as may be prescribed. In addition, the past performance and desire of each student is evaluated to determine if he or she has the potential for eventual commissioning.

When students are accepted for the Advanced Course or begin a scholarship, they execute a written contract with the U.S. government. Under terms of the contract, they agree to complete the Advanced Course and to accept a commission if tendered. Concurrently with the signing of the contract, students enlist in the United States Army Reserve for control purposes.

Classroom study in the Advanced Course includes one military science course each semester on such subjects as leadership and management, small-unit tactics, and command and staff organization and functions. The two hours a week of practical leadership training continues, and between the junior and senior years all cadets attend a six-week advanced summer camp currently conducted at Fort Bragg, North Carolina.

Scholarships

Scholarships are awarded on the basis of merit and are available for two, three, or four years. AROTC scholarships are awarded each year to outstanding Basic Camp participants and students in the freshman and sophomore classes. Cadets who are awarded scholarships continue to receive support until graduation as long as they fulfill the requirements. Scholarships pay up to $8,000 or 80 percent of tuition and mandatory fees. Scholarship cadets and Advanced Course cadets also receive $100 a month for up to ten months a year. Scholarship cadets receive an additional amount to defray the cost of books.

Commissioning

All students who successfully complete the Advanced Course, including the advanced summer camp, are commissioned as second lieutenants in the United States Army Reserve or Regular Army upon graduation.

Service Obligations

ROTC graduates may serve on Active Duty, in the Army Reserve, or in the National Guard, depending upon the needs of the Army.

Officers beginning active duty first attend the Officer Basic Course (normally ten to sixteen weeks) of their assigned branch. Upon completion of this course, officers are

assigned to a unit and location that is determined by the desires of the individual and the requirements of the Army. Those officers selected for reserve duty attend the Officer Basic Course, after which they are released to reserve status.

Nonscholarship cadets accepting a Regular Army commission serve a minimum of three years on active duty followed by five years in reserve status.

Scholarship cadets, whether commissioned in the Regular Army or the Reserve, generally serve four years on active duty and four years in reserve status; however, some may serve eight years on reserve duty.

Choice of Branch

Cadets in the second year of the Advanced Course (normally the senior year) may specify the branch of the Army—such as Infantry, Corps of Engineers, Armor, Signal Corps, Field Artillery, Air Defense Artillery, Ordnance, Chemical, Adjutant General, Quartermaster, Finance, Medical Service, Military Intelligence, Military Police—in which they prefer to serve. They are notified in the spring, before commissioning, of the branch to which they are assigned. The likelihood of appointment in a chosen branch depends upon the student's academic and officer education performance, degree area, and the needs of the Army at that time.

Graduate Study

Active duty deferments, or educational delays, may be granted to individuals who want to attend graduate school at their own expense. Requests will be considered on the basis of needs of the service. Admission to graduate school is the student's responsibility.

Benefits

Each cadet in the Advanced Course (Mil S III and Mil S IV) receives $100 a month for up to ten months a year. While attending the advanced summer camp (between the junior and senior years), each cadet receives approximately $700 and an allowance for travel to and from camp. A cadet in the Two-Year Program receives the same payments as cadets in the Advanced Course and, in addition, receives approximately $700 and travel costs for summer Basic Camp attendance before entering the Advanced Course.

Military Science Courses

All cadets take one course and a leadership laboratory each semester in military science. The number of hours a week spent in the classroom varies from semester to semester, as does the credit received for each course.

Freshman Year (Mil S I)

Mil S 101 United States Organization for Defense
Fall. 1 credit. Required.
Staff.
Students examine the U.S. defense structure in terms of organization, mission, personnel, and relationships among military forces and between the military forces and various branches and departments of the government. The United States Army force structure is examined at all levels. The complexities and magnitude of operating the defense organization are studied to provide a framework for subsequent instruction.

Mil S 102 Leadership Theory
Spring. 1 credit. Required.
Staff.
This course allows students to develop a basic understanding and appreciation of the theories of social and organizational psychology and behavior as they apply to the military setting. Attention is given to leader types, the source and exercise of authority, and the impact of varying styles of leadership on motivation and organization effectiveness. The student is introduced to the concepts of integrity, ethics, and professionalism.

Sophomore Year (Mil S II)

Mil S 321 Armed Conflict and Society
Fall. 3 credits. Optional.
3 classes each week. Presentation by Army, Marine Corps, Navy, and Air Force instructors with guest lecturers, primarily from government and history departments. A study of modern warfare that examines the relationship of military strategy to geography, economics, sociology, technology, and national political realities and values; the evolution of warfare, including principles of war, weapons, and associated equipment; and the effects of nuclear weapons and guerrilla warfare on traditional concepts of national strategy. Emphasis is on the American experience.

Mil S 221 Mapping: Land Navigation
Fall. 1 credit. Required.
Staff.
This course provides practical knowledge of the various forms of topographic representation. Students interpret and use maps in terrain association and land navigation. Knowledge of topography is complemented by an orientation on significant environmental influences from physical, social, and climatic factors. Portions of the course offer practical experience in land navigation and orienteering.

Mil S 222 Small Organizational Operations
Spring. 1 credit. Required. Prerequisite: Mil S 102 or instructor approval.
Staff.
In this course students learn the basic principles of group dynamics at the level of the smallest military unit, the squad. Troop-leading procedures are introduced through case studies and role-playing exercises. Leadership theories introduced in Mil S 102 are examined in a variety of realistic settings. The practical application of behavioral theories is explored in the context of small military organizations.

Junior Year (Mil S III)

Mil S 331 Theory and Dynamics of the Military Team
Fall. 2 credits. Required.
Staff.
After an initial introduction to techniques of presenting briefings, students are provided with a broad understanding of the principles and application of teamwork in military organizations. Particular emphasis is given to leadership responsibilities of the commander as the team coordinator. Additionally, students have an opportunity to develop an understanding of the roles and contributions of the various branches of the Army in support of the military team.

Mil S 332 Leadership in Small-Unit Operations
Spring. 2 credits. Required. Prerequisite: Mil S 331.
Staff.
This course provides an understanding of the nature of decision making and the tactical application of the military team. Through the use of conferences and extensive practical exercises, students develop familiarity with the factors influencing a leader's decisions; the processes of planning, coordinating, and directing the operations of military units through operation plans and orders.

Senior Year (Mil S IV)

Mil S 441 Contemporary Military Environment I
Fall. 2 credits. Required.
Staff.
An overview of the functions, responsibilities, and interrelationships among small-unit leader, the commander, and the staff. Detailed discussions focus on actions of small-unit leaders, communication skills, the military justice system, and the logistical support of the army in the field.

Mil S 442 Contemporary Military Environment II
Spring. 2 credits. Required.
Staff.
A continuation of Mil S 441. Students examine the leadership environment of the Army officer. Conferences and seminars examine the techniques of effective military leadership with special attention given to professionalism and ethical considerations in the armed forces during peacetime and armed conflict.

Practical Leadership Training

All Army Officer-Education Students

As with many laboratory periods, no credit is given, and participation is required for successful completion of the AROTC program. Students will receive physical education credit for the laboratory.

Each semester, cadets register for the appropriate leadership laboratory, which includes physical fitness training three times per week, two hours of military training each week, and one or two weekend training exercises per semester.

Mil S I Leadership Laboratory I

Fall.	Spring.
Mil S 151	Mil S 152

Mil S I cadets meet for two hours each week to learn a variety of military skills including rappelling, first aid, drill and ceremonies, military skiing, and weapons familiarization.

Mil S II Leadership Laboratory II

Fall.	Spring.
Mil S 251	Mil S 252

Cadets meet for two hours each week as members of the cadet organization to participate in practical leadership exercises. Types of practical activities include familiarization in rifle marksmanship, orienteering, drill and ceremonies, signal communications, physical fitness training, tactics and field exercises.

Mil S III Leadership Laboratory III

Fall.	Spring.
Mil S 351	Mil S 352

Cadets meet for two hours a week to prepare for a six-week summer camp that follows the

junior year. Emphasis is on the development of individual skills in leadership techniques and practical skills. Cadets rotate through leadership positions to develop an ability to apply decision-making processes to a myriad of situations. They also acquire technical expertise and proficiency in signal communications, physical fitness, drill and ceremonies, rappelling, orienteering, tactics, water survival, and other military skills.

Mil S IV Leadership Laboratory IV
Fall. Spring.
Mil S 451 Mil S 452
Senior cadets plan and operate the leadership laboratory programs for Mil S I–III cadets. The development of planning and supervisory skills is emphasized. Cadets have an opportunity to practice leadership skills developed during previous ROTC training and summer camp experiences. This also includes two to three hours a week devoted to physical fitness.

Professional Military Education (PME) Requirements

In addition to the ROTC classes and leadership laboratories above, a number of courses are required as part of the student's academic program. These courses are offered by the university and round out the student's professional education. The PME component of the ROTC program requires at least one college course in each of the following areas: human behavior, written communication skills, military history, math logic, and an introduction to computers. Scholarship recipients must also complete a course in a foreign language. These courses must be completed prior to graduation and commissioning. Courses that meet these requirements are approved by the Professor of Military Science.

NAVAL SCIENCE

Captain G. J. Corcoran, United States Navy, Professor of Naval Science and Commanding Officer, Naval ROTC Unit

Commander S. M. Ongley, United States Navy

Captain S. W. Dowling, United States Marine Corps

Lieutenant R. K. Lee, United States Navy

Lieutenant J. D. Lilly, United States Navy

Lieutenant C. D. Orwall, United States Navy

The objective of the Naval Officer Education Program is to prepare selected students for service as commissioned officers in the United States Navy or United States Marine Corps by supplementing their undergraduate education with instruction in essential concepts of naval science and fostering development in the qualities of leadership, integrity, and dedication to their country and the naval services. The program is compatible with most undergraduate major fields of study, including five-year baccalaureate degree programs on a case-by-case basis.

The objective is achieved through a broad program, normally covering four years, that combines specific courses in naval science and specified academic subjects to supplement weekly professional development sessions in which the practical aspects of naval science and leadership procedures are stressed. It also includes at least one summer-at-sea period.

Non–naval officer education students. Though the Navy–Marine Corps program has been designed to prepare future officers, Naval science courses are open to all students at Cornell University as space limitations allow.

Requirements for Enrollment

An applicant for the Naval ROTC program at Cornell must be a citizen of the United States. Applicants must have reached their seventeenth birthday by June 30 of the entering year and be less than twenty-five years of age on June 30 of the calendar year in which they are commissioned. Waivers of the upper age limit may be available for applicants who have prior active duty military service. Applicants must also meet physical and medical requirements. Interested students can visit the Naval ROTC Unit in Barton Hall or contact their local recruiter.

Programs

There are two programs: the Scholarship Program and the College Program. They differ primarily in benefits to the student and type of commission earned.

Scholarship Program

The Scholarship Program provides approximately three thousand scholarships in more than sixty universities nationwide to selected students who want to serve in the Navy or Marine Corps. Financial support is provided students during college preceding the award of the baccalaureate degree.

Benefits

The program provides uniforms, full tuition, most instructional fees, textbooks, nonconsumable supplies, and $100 a month for a maximum of forty months.

Successful completion of the Scholarship Program leads to a regular commission in the Navy or Marine Corps. At Cornell University over 90 percent of NROTC students have a scholarship. Students entering NROTC without a scholarship are entitled to compete for one-, two-, or three-year scholarships controlled by the Chief of Naval Education and Training.

Entering the Scholarship Program

There are three ways to enter the Scholarship Program:

First, by applying for the national competition each year. This entails filling out and sending an appropriate application; being interviewed; having a physical examination; and applying to, and being accepted by, one of the colleges or universities throughout the country that offers an NROTC program.

Second, by enrolling in the College Program at Cornell and being recommended by the Professor of Naval Science for a scholarship after at least one semester in the program.

Third, by entering through the Two-Year Scholarship Program.

College Program

There are two College Programs available. Both lead to a commission in the Naval or Marine Corps Reserve and a minimum of three years of active duty.

Each of these programs provides textbooks for naval science courses, uniforms, and a subsistence allowance of $100 a month from the beginning of the junior year.

The regular College Program is four years long. Academic requirements for students in this program are somewhat less than those for scholarship students, as noted in the curriculum section of this booklet.

The Two-Year College Program begins the summer before the junior year, when students attend a required program with pay at the Naval Science Institute in Newport, Rhode Island.

Summer Training

Each summer, students in the Scholarship Program spend approximately four to six weeks on a Navy ship, the unit sail-training vessel *VINDICATOR*, or with a naval activity anywhere in the world for on-the-job training. College Program students attend one summer training session of the same duration between the junior and senior years. While attending summer training sessions, midshipmen are paid approximately $500 a month.

Active Duty Requirements

As required by Section 2107, Title 10, United States Code, selected applicants must enlist in the United States Naval Reserve for eight years in pay grade E-1 (seamen recruit) before being appointed Midshipman, USNR, and receiving compensation. Students who are disenrolled from the NROTC Scholarship Program for reasons beyond their control will, upon disenrollment, be discharged from their enlisted status. It should be understood that two years' active enlisted service may be required of those students who default on the terms of their NROTC contract after the beginning of their sophomore year.

Officers commissioned in the Regular Navy or Marine Corps serve on active duty for a minimum of four years. Those commissioned in the Naval or Marine Corps Reserve serve a minimum of three years on active duty. Specialized training such as aviation or nuclear power following commissioning adds additional active duty requirements in some cases.

Choice of Assignment

Graduates have an opportunity to request the duty they prefer upon graduation. These requests are given careful consideration, and every effort is made to assign the newly commissioned officer the duty of his or her choice.

Among the types of assignments are duty in nuclear propulsion for surface ships and submarines, naval aviation, and large and small surface ships. Other specialties are available on a limited basis.

Marine Corps Options

The United States Marine Corps is an integral part of the Naval Services and is commanded by the Commandant of the Marine Corps. One-sixth of the NROTC scholarship students may be Marine selectees who will be designated Marine-option midshipmen. Upon successful completion of the program they will be appointed second lieutenants in the United States Marine Corps.

Marine-option midshipmen will follow the same program as other NROTC midshipmen for the first two years. Beginning with the junior year, Marine-option midshipmen will be taught Marine oriented courses by a Marine Officer Instructor. For first class summer training (after the junior year), known as the USMC Officer Candidate School, Marine-option students will travel to Quantico, Virginia, where they will undergo six weeks of intensive training. Upon commissioning the following year as second lieutenants, they will be assigned to the Basic School at Quantico, Virginia. After the Basic School, the Marine officer is assigned duty in a variety of occupational fields. Among the duties available are Infantry, Aviation, Artillery, Tracked Vehicles, Engineers, Communications, Electronics, Supply, Administration, and Computer Science. The officer may serve on board naval vessels or at shore installations of the Marine Corps or Navy, in this country or overseas.

The Marine Corps has a postgraduate training system similar in objectives and organization to that of the Navy. Marine officers selected for aviation receive flight training at the Naval Air Station, Pensacola, Florida, along with their Navy counterparts.

Curriculum

A student has three categories of requirements to fulfill as a midshipman. The first of these requirements is a weekly naval professional development session each semester. The second requirement is a naval science course each semester. The last set of requirements consists of other required courses prescribed by the Navy to meet the growing need for more and better technically educated junior officers.

Naval Professional Laboratories

Nav S 141–142, 241–242, 341–342, or 441–442

All students in the program participate in one ninety-minute professional development session each week. The session is held from 2:30 until 4:00 on Wednesday afternoon. This period consists of both drill and professional information briefings. Students gain experience in actual leadership situations and at the same time learn the fundamentals of seamanship, military formations, movements, commands, discipline, courtesies, and honors. During information briefings special emphasis is given to applied leadership as it relates to the administrative and managerial aspects of a Navy or Marine Corps officer's duties.

Naval Science Courses

All Navy and Marine midshipmen take one naval science course together each semester during their freshman and sophomore years. Navy-option students continue to take a naval science course each semester during their junior and senior years. Marine-option students are required to take the History of Amphibious Warfare and the Evolution of Warfare courses in either their junior or senior year, depending on when the courses are offered.

Freshman Year (Navy and Marines)

Nav S 101 Fundamentals of Naval Science

Fall. No credit.
Two-hour class each week (lecture-recitation). Lt. Jason D. Lilly, USN.
A study of fundamental aspects of naval science, including its conceptional contributions to sea power, factors involved in the physical development of naval forces, resources that must be managed, and prospects for the future. Naval uniforms, customs, and traditions also covered.

Nav S 102 Sea Power and Maritime Affairs

Spring. 2 credits.
Two classes each week. Lt. Jason D. Lilly, USN.
Discussions examine the history of the Navy as a force in diplomacy. Relationships between Congress and the military for determining the national defense policy are also explored. An integrated examination of current events and issues gives a historical perspective throughout the course.

Nav S 157 Principles of Sailing

Fall and spring. Physical education credit.
One class each week.
Instruction in basic sailing skills and safety principles. Students sail small and large boats on Cayuga Lake, weather permitting. Focus is U.S. Navy Class B inshore skipper and offshore crewman A certifications.

Sophomore Year (Navy and Marines)

Nav S 201 Organizational Behavior and Small Group Processes (also Hotel Administration 212)

Fall. 3 credits.
See description for Hotel Administration 212.

Nav S 202 Naval Ship Systems I (also Mechanical and Aerospace Engineering 101)

Spring. 3 credits. Three lecture-recitation classes each week.
Prof. M. Louge, Lt. Chris Orwoll, USN.
An introduction to primary ship-systems and their interrelationship. Basic principles of thermodynamics, propulsion, mechanical operation, internal communications, electronics, ship structure, and other marine systems are considered.

Junior Year (Navy)

Nav S 301 Principles of Navigation (also Agricultural Engineering 305)

Fall. 4 credits.
Four classes each week (lecture-recitation-project work). Lt. Robert K. Lee, USN.
The course covers coordinate systems, chart projections, navigational aids, instruments, compass observations, tides and currents, and soundings. It also includes celestial navigation, time, spherical trigonometry, motion of the stars and sun, star identification, position fixing, use of the nautical almanac, and electronic navigation systems.

Nav S 302 Naval Operations

Spring. 3 credits.
Three lectures each week.
Lt. Robert K. Lee, USN.
The course covers the application of command and control principles and the integration of sensors and weapons systems in the conduct of naval operations. Visual and electronic communications methods, data-systems employment, tactical disposition of forces, and fleet logistics support are studied. Topics in shiphandling are also discussed.

Senior Year (Navy)

Nav S 401 Naval Ships Systems II (Weapons)

Fall. 3 credits.
Three classes each week.
Lt. Christopher D. Orwoll.
The principles and theories used in the development of naval weapons systems are examined. Initially, extensive study is made of sensing and detection systems, especially radar and sonar, followed by discussions of ancillary systems for computing, tracking, stability, and weapons control and delivery.

Nav S 402 Naval Administration Topics

Spring. Two credits.
Two classes each week.
Cdr. Susan M. Ongley, USN.
A variety of topics important to the naval officer for both professional and managerial development are reviewed. The material is directed at the midshipman for understanding naval administration and for use in the role of the division officer in counseling subordinates. Through the use of lectures, situation problems, and role playing, the student will learn about the various aspects of Navy management and administration.

Junior or Senior Year (Marine Options)

Nav S 310 Evolution of War

Fall. 3 credits.
3 classes each week.
Captain Steven W. Dowling, USMC
A study of warfare that examines the relationship of military strategy to geography, economics, sociology, technology, and national political realities and values; the evolution of warfare, including principles of war, weapons, and associated equipment; and the effects of nuclear weapons and guerrilla warfare on traditional concepts of national strategy.

Nav S 410 History of Amphibious Warfare

Spring. 3 credits.
Three lectures-recitations each week.
Captain Steven W. Dowling, USMC
The history of the development, theory, techniques, and conduct of amphibious operations from 490 B.C. to the present. Special emphasis will be on amphibious operations conducted in the central Pacific during World War II. Additionally, the future of amphibious operations will be discussed.

Other Required Courses

Navy Option Scholarship Program

To be eligible for a commission in the United States Navy, midshipmen must successfully complete all the requirements for a baccalaureate degree in any field of study offered by Cornell University and complete courses in the following subjects (specified courses to be approved by the Professor of Naval Science):

American military affairs or national security policy (one semester)

English (one year)

calculus (one year)

calculus-based physics (one year)

computer science (one semester)

modern foreign language (one semester)—this requirement may be waived by the Professor of Naval Science under some circumstances.

The calculus requirement must be satisfied by the end of the sophomore year and the physics requirement by the end of the junior year.

Although free choice of academic majors is permitted, students are encouraged to pursue majors in engineering and the physical sciences to meet the technological requirements of the modern Navy.

Navy Option College Program

Navy-option College Program students must complete one year of college-level study in mathematics, physical science, and English as a prerequisite for commissioning. The mathematics course must be completed by the end of the junior year; the physical science course by the end of the senior year. In addition, one term of computer science is required. College Program students who desire entry into the Navy-option Scholarship Program should fulfill all of the requirements applicable to Navy-option scholarship students to be eligible and competitive for a scholarship controlled by the Chief of Naval Education and Training.

Marine Option

Any midshipman, in either the Scholarship Program or the College Program, who completes all of Cornell University's degree requirements in any academic major is eligible for a commission in the United States Marine Corps or United States Marine Corps Reserve. Marine-option students take the same naval science courses and naval professional laboratories as Navy-option students for the freshman and sophomore years. During the junior and senior years, Marine-option students meet with the Marine officer instructors for naval professional laboratories and take two naval science courses. In addition, two semesters of courses (a minimum of three hours each) in the subject area of American Military Affairs or National Security Policy are required. One semester of a modern foreign language must be completed.

University Courses

A wide range of courses satisfy Naval ROTC specified courses. Students should consult their naval science adviser concerning appropriate course selections. A partial list of those Cornell University courses that meet academic requirements of the program follows.

Calculus

Math 111, and 112 or 122 Calculus

Math 191 and 193 or 192 Calculus for Engineers

Physics

Phys 112 or 116, and Phys 213 or 217

Phys 207–208 Fundamentals of Physics

Computer Science

Engr 100 Introduction to Computer Programming

Com S 100 Introduction to Computer Programming

Com S 102 Introduction to Microcomputer Applications

ABEN 102 Introduction to Microcomputer Applications

EDUC 247 Instructional Applications of the Microcomputer

American Military Affairs or National Security Policy

An updated list of courses satisfying the prerequisites of this category is published annually.

English

Fulfilled by completing freshman writing seminar course requirements.

Extracurricular Activities

The NROTC midshipman at Cornell is offered a broad range of activities in which to participate. Each summer, as an optional part of their summer training, midshipmen sail aboard the unit sail-training vessel Vindicator to distant ports of call. Back at Cayuga Lake, a highly respected command and seamanship program offers instruction, both in small sailboats and in large-boat sailing on board Vindicator, to all who want to participate. The unit offers a comprehensive sports program in which most midshipmen participate. The naval unit has won the Independent Division All Sports Trophy for fifteen of the last twenty-one years. Midshipmen participate in a myriad of social events, including the annual Navy/Marine Corps ball and traditional naval mess nights.

DEPARTMENT OF AEROSPACE STUDIES

Colonel Keith W. Rhyne, United States Air Force, Professor of Aerospace Studies and Commander, Air Force ROTC Detachment 520

Captain Jamie C. Scotland, United States Air Force

Captain Robert G. Dawson, United States Air Force

Captain Edgar M. Hollandsworth, United States Air Force

The objective of the Air Force officer education program at Cornell is to prepare men and women for positions as officers in the United States Air Force. The program is designed to teach students about the role, mission, and organization of the Air Force and the historical development of airpower, and to develop their leadership and management skills. Additionally, students study national security policy and formulation and the role of the military in a modern democratic society. The objectives are achieved through the Four-Year or the Two-Year program. These programs include specific courses in aerospace studies and practical laboratories.

Entering students are assigned to one of five categories: flying (pilot-navigator), missile, nonrated operations, engineering-science, and nontechnical. These assignments are based on the student's preferences, qualifications, and academic field of study and the needs of the Air Force.

Requirements for Enrollment

The Air Force officer education program is open to any undergraduate or graduate student enrolled in any major field of study. The student's academic course of study is often a prime factor in determining the kind of career pursued in the Air Force. (See Air Force Careers, below.)

Applicants must be United States citizens. Noncitizens may enroll and will receive certificates acknowledging completion of the course but cannot receive a commission.

Applicants who are interested in flying (as pilot or navigator) or missile duty should make that request known at the time they enter the program.

All applicants receive physical examinations at no cost and, to be accepted, must meet certain physical requirements.

Those students who are interested in qualifying for flying categories (pilot or navigator) must meet more stringent physical requirements.

Though the program is designed to prepare future Air Force officers, Department of Aerospace Studies courses are open to all students at Cornell.

Four-Year Program

The Four-Year Program is open to all freshmen. Sophomores may enter the program but require departmental approval. Students in a five-year degree program may enroll in their freshman or sophomore year.

Veterans of the U.S. armed forces and students entering Cornell from military schools may receive advanced standing, subject to approval by the Professor of Aerospace Studies.

The Four-Year Program consists of the General Military Course (GMC) and the Professional Officer Course (POC). For scholarship cadets, the first year of the GMC carries no military commitment, and students may withdraw at any time. For nonscholarship cadets, both years of the GMC carry no military commitment, and students may withdraw at any time.

General Military Course

Students in the General Military Course (GMC) take one credit of classroom work offered by the Department of Aerospace Studies each semester. During the freshman year the student examines the organization and mission of the United States Air Force and the role of U.S. military forces in the contemporary world. In the sophomore year, the student studies the history and development of military aviation and American air power. In both years, officership and professionalism within the United States Air Force are emphasized.

Students also spend 1–2 hours a week in a leadership laboratory. Leadership Laboratory provides cadets with the opportunity to put into practice those skills they learn in their aerospace studies classes. These laboratories focus on the development of officer qualities through such activities as drill and ceremonies, a variety of guest speakers, and practical exercises. In addition, all students participate in summer field training for four weeks between their sophomore and junior years.

Professional Officer Course

The Professional Officer Course (POC) is a two-year advanced course of instruction. Students who are accepted for the POC must have successfully completed or validated the basic course and must meet the academic and physical standards. Each cadet accepted into the POC must sign an agreement to complete the program and accept, if tendered, a commission in the United States Air Force on graduation.

Classroom study in the POC requires three hours a week each semester. In the junior year, cadets study Air Force leadership and management at the junior officer level. During the senior year, cadets study the elements of national security and the military's role in American society. Leadership laboratory requires a minimum of 1–2 hours a week in the junior and senior years. In the leadership laboratory, cadets are exposed to advanced leadership experiences and apply principles of leadership and management learned in the classroom.

Two-Year Program

The Two-Year Program consists of the last two years (Professional Officer Course) of the regular Four-Year Program plus a six-week summer training course preceding enrollment. (Details of the Professional Officer Course are given above.)

The Two-Year Program is open to all students with two years of academic study remaining at Cornell (graduate or undergraduate) or at schools under crosstown or consortium agreement. Applications are accepted from October through April of the academic year preceding the applicant's planned entry into the program. Selectees are then required to successfully complete a six-week summer training program at government expense.

Scholarships

Air Force ROTC offers four-year scholarships on a competitive basis to high school seniors and graduates who will major in selected scientific and technical areas such as engineering, mathematics, meteorology, and computer science. Four-year scholarships are also awarded on a limited basis to individuals who will major in nontechnical areas. Scholarship information can be obtained from a high school guidance counselor, from Air Force ROTC officers at a campus offering Air Force ROTC, from a local Air Force recruiter, or from AFROTC/RROO, Maxwell AFB, AL 36112–6663. The deadline for submitting a four-year scholarship application is December 1 of the year preceding the academic year in which a student wants to enter the program. Students should apply early.

Scholarships for 2 years also are available to college students. Applications for these scholarships should be made to the Professor of Aerospace Studies during the freshman or sophomore years of college. All selections are based on the student's major, scores achieved on the Air Force Officer Qualifying Test, the student's overall grade point average, and the rating from an interview board composed of Air Force ROTC staff officers. Scholarship amounts range from $8,000 per year to full tuition and provide a $100 monthly nontaxable allowance during the school year. In addition, scholarships pay for the cost of all required course textbooks.

Fees

An initial uniform deposit of $30 is required on entry into AFROTC. There are two subsequent $30 uniform payments due, one on entry into the POC and the final one before commissioning, at which point the cadet owns the uniform.

Benefits

All cadets in the advanced program (POC) receive a $100-a-month, nontaxable subsistence allowance during the academic year. During the four- or six-week summer field training (see below), each cadet receives the pay allowance authorized by current directives, plus an allowance for travel to and from the field site. Most textbooks and supplies required for Department of Aerospace Studies courses are provided.

All cadets are eligible to participate in AFROTC-sponsored field trips made to Air Force bases throughout the country. Scholarship and advanced cadets (POC) are entitled to space-available travel on Air Force aircraft flying within the continental United States.

Field Training

There are two types of field training: a four-week course for cadets in the Four-Year Program and a six-week course for Two-Year Program applicants. Students in these programs normally attend field training between their sophomore and junior years. Field training is hosted each summer by several active Air Force installations.

Field training is designed to stimulate the development of military leadership and skills through meaningful experiences. The curriculum consists of aircraft, aircrew, and survival orientation; junior officer training; physical training; small arms training; a social-actions program; and supplemental training. Special emphasis is placed on career orientation and interaction with other young officers in fields of interest to the student. The six-week training program is unique because it has an additional sixty hours of Air Force ROTC academic course work that substitutes for the freshman and sophomore Aerospace Studies courses.

Pilot candidates attend a three-week light aircraft training program between their junior and senior years unless they already hold a private pilot's certificate. Objectives of the program are to train and motivate qualified cadets toward a rated career and to screen those cadets who have the potential to become Air Force pilots.

In addition to field training, cadets may volunteer and, if selected, attend one of many Advanced Training Programs. Some of these programs include Army Airborne Training, Cadet Training Officer (CTO) Program, Strategic Defense Initiative Organization (SDIO), and the British Royal Air Force (RAF) Exchange Program.

Commissioning Obligations

All students who successfully complete the AFROTC advanced program (POC) and who are awarded a baccalaureate degree and are tendered a commission enter the Air Force as second lieutenants.

Second lieutenants commissioned in nonflying categories are required to serve on active duty for four years. Pilots are required to serve on active duty for eight years after completing flying training and receiving their aeronautical rating. Navigators serve six years after completing training. Some newly commissioned officers are allowed to postpone active service to earn advanced degrees through the Administrative and Educational Delay Programs. Limited numbers of active duty assignments to graduate school in engineering and scientific disciplines may also be available in return for an additional active duty service commitment.

Air Force Careers

Air Force policy has been to assign new officers to a career field appropriate to their educational background. Students in the engineering-scientific category may be assigned to practice in their specialty in research and development, communications, electronics, aeronautics, astronautics, the biological sciences, computer design and maintenance, meteorology, space, or various other engineering and scientific fields. Those graduating in the nontechnical category can anticipate assignments in manpower management, information management, logistics, police and investigation, intelligence, personnel, transportation, accounting and finance, and numerous other career fields, including nonrated operations. They will use their educational backgrounds in positions of responsibility and be given the opportunity to further their development in leadership and management skills.

Any undergraduate major is suitable for those who are qualified and interested in becoming pilots or navigators. After completion of flying training they are assigned primary duties flying various kinds of aircraft.

Officers who elect missile duty will train and be assigned to one of the operational missile bases as a crew member. This type of assignment provides an opportunity for a young officer to obtain command experience.

Curriculum

Students in the Four-Year Program are required to take all courses listed below. Students in the Two-Year Program are required to take all of the courses listed for the junior and senior years.

Freshman Year

Air S 161 United States Military Forces
Fall. 1 credit.
One class each week.
A study of current U.S. military forces with emphasis on the analysis of the doctrine and mission of the United States Air Force. Army and Navy operations, as contributions to the total national defense, are reviewed. Current factors affecting today's professional military officers are considered.

Air S 162 Aerospace Operations
Spring. 1 credit.
One class each week.
The aerospace forces of the United States are studied with emphasis on the organization and resources of the United States Air Force. The elements of strategic offensive, defensive general-purpose, and aerospace support forces throughout the world are also studied.

Sophomore Year

Air S 211 Development of Military Aviation
Fall. 1 credit.
One class each week.
Factors leading to the development of aviation and the concepts and doctrine for the employment of air power are studied. Topics to be reviewed and analyzed include the history of manned flight, the effects of World War I on the uses of aviation, the development of pre–World War II aircraft, and the political struggles for an independent U.S. air arm. The role of air power in World War II, including strategic bombing, tactical air power, and the role of air superiority in warfare, is examined.

Air S 212 American Air Power since 1947
Spring. 1 credit.
One class each week.
The employment of the United States Air Force since World War II in military and nonmilitary operations to support national objectives is discussed. The part played by the United States Air Force in activities such as the Berlin airlift and national and international relief missions is discussed. The role of air power in the Korean conflict, the Cuban crisis, and the Vietnam War is examined from the viewpoint of technology and tactical doctrine. Additionally, the United States Air Force's modernization and increased air power abilities of the 1980s will be examined.

Junior Year

Air S 331 Leadership, Ethics, and Communicative Skills
Fall. 3 credits.
Two classes each week.
The course is divided into three major parts. Part one provides an introduction to the principles and techniques used in the development of effective communicative skills used in the United States Air Force. Part two explores leadership as a function of the management principle of directing. Attention is given to the impact that various leadership styles have on human motivation and organizational effectiveness. Current leadership research and theory and the responsibilities of command are considered. Part three considers acceptable ethical behavior and morality while serving in the United States Air Force. Student-run seminars, case-study exercises (including role-playing), and oral and written assignments are required.

Air S 332 Management
Spring. 3 credits.
Two classes each week.
Introductory course that deals with officer professional development, the basic principles of management, and group dynamics. Students may visit local production facilities to observe manufacturing techniques and they will study quantitative methods used to enhance the management decision-making process. Also considered is the role of management in the development of a corporate code of ethics. Student seminars, case studies, problem sets, and written and oral presentations are required.

Senior Year

Air S 461 Political-Military Relations I
Fall. 3 credits.
Cadets enroll in a predesignated history department course dealing with the relationship between war and society, and are required to meet for an additional 50-minute weekly discussion section.

AS 463 Political-Military Relations II
Spring. 4 credits.
Cadets enroll in a pre-designated Cornell University government department course dealing with U.S. national security affairs and are required to meet for an additional 50-minute weekly discussion section.

Leadership Laboratory Courses

All Air Force cadets spend at least 1–2 hours a week throughout the academic year in a leadership laboratory, for which no academic credit is given. Occasionally laboratories are held at times other than the normally scheduled period. All cadets are expected to participate in an evening dining-in and to meet minimum physical fitness and weight standards each semester.

Air S 141–142 Initial Military Experiences
Introduction to the responsibilities, life, and work of an Air Force officer. Basic knowledge of drill and ceremonies, military courtesies, and the wearing of the uniform. Field trip to a local military installation.

Air S 241–242 Intermediate Military Experiences
Develops skills in giving commands for drill and ceremonies. Introduction to the Air Force base environment in which the Air Force officer functions. Includes a look at career areas available based on academic majors. Students experience and participate in leadership situations through military drills and ceremonies. Field trip to a local military installation.

Air S 341–342 Junior Officer Leadership
Cadets assume leadership responsibilities similar to those of a junior officer. Emphasis is on comprehending the importance of applying effective human relations in dealing with superiors, peers, and subordinates. Cadets also gain insight into the general structure and progression patterns common to selected Air Force officer career fields.

Air S 441 Advanced Leadership Experiences
Command leadership in operating a military organization. Cadets apply effective leadership and managerial techniques with individuals and groups and participate in self-analysis of leadership and managerial abilities.

Air S 442 Precommissioning Laboratory
Factors that facilitate transition from civilian to military life are reviewed. The need for military security, base services and activities, personal finances, travel regulations, and social obligations are introduced.

DEPARTMENT OF PHYSICAL EDUCATION AND ATHLETICS

ADMINISTRATION

Alan E. Gantert, director

George S. "Jack" Writer, assistant director

COURSES

The courses and fees described in this catalog are subject to change or cancellation at any time by official action of Cornell University.

Enrollment in any course is limited by the space available. Other restrictions are included in the course description. Most courses are coeducational. The specific time and place of class meetings, as well as information about fees, are available at physical education course registration. Course fees are billed through the Office of the Bursar.

Additional course offerings may be listed at registration, since the curriculum is frequently reviewed and changed.

Alexander Technique
Fall and spring.
Two classes a week, Helen Newman Hall.
Exercise routines that increase sensory awareness.

Basic Archery
Fall and spring. Two classes a week, Alberding Fieldhouse.
Instruction in the care of equipment; seven basic steps for shooting; scoring; practice shooting at twenty, thirty, and forty yards.

Intermediate Archery
Fall and spring.
For those who have basic experience.

Badminton
Fall and spring. Helen Newman Hall.
Two classes a week.
Fundamental shots, scoring, and general play.

Basketball
Fall and spring. Barton Hall and Alberding Fieldhouse.
Two classes a week.
Fundamental drills in passing, shooting, and dribbling. Scrimmages each class session.

Bowling
Fall and spring. Fee charged.
Two classes a week, Helen Newman Hall.
For the beginning and intermediate bowler. Shoe rental is included in the fee.

Boxing
Fall and spring.
Two classes a week, Teagle Hall.
Fundamentals of training methods.

Equitation
Fall and spring. Fee charged.
One class a week, Cornell Equestrian Center. Class days and hours are arranged at registration.
Instruction in English riding and jumping.

Fieldhockey
Spring.
Two classes a week, Alberding Fieldhouse and Schoellkopf stadium.
Instruction in basic and advanced skills. 6-aside competition on astroturf surface.

Advanced Football Conditioning
Spring.
Two classes a week, Alberding Fieldhouse.
A conditioning program for the advanced student athlete. An intense exercise program aimed at developing the cardiovascular system.

Fitness and Conditioning
Fall and spring.
Two classes a week. Teagle Hall.
Physical fitness program that embodies features of stretching exercises, weight lifting, and jogging. Students work on their individual training needs.

Fitness–Exercise–Nutrition
Fall and spring.
Two classes a week, Helen Newman Hall.
Ways in which exercises may be used in weight control, the role of nutrition and diet in weight control, and the design of an individual exercise and running program.

Fitness for Women
Fall and spring.
Two classes a week, Helen Newman Hall.
Fitness program that is geared toward women's own interests and abilities. Nutrition, time management, relaxation techniques, and stress management are included.

Flexibility and Toning
Fall and spring.
Two classes a week, Helen Newman Hall.
Overall stretching exercises.

Judo
Fall and spring. Fee charged.
Two classes a week, Teagle Hall.
Conditions and increases suppleness. Develops skills in the two parts of judo: standing techniques (throws and trips) and mat techniques.

Lacrosse
Fall.
Two classes a week, Helen Newman Field.
Instruction and practice in basic skills (cradling, passing, catching, goal shooting, checking) and team play.

Nautilus
Fall and spring. Enrollment limited to capacity of facilities. Fee charged.
Two or three classes a week, Schoellkopf Hall.
Advanced weight lifting on specifically designed apparatus. There are ten stations in the room.

Olympic Weight Training
Fall and spring.
Teagle Hall.
Introduces the student to the proper use of olympic weights for improving physical condition and muscular strength. Instruction with focus on the relation between high-rep light weight lifting, low-rep heavy lifting, and the development of bulk, strength, and endurance.

Racket Games
Fall and spring.
Two classes a week, Grumman Squash Courts and Helen Newman Hall.
Racquetball, squash, badminton, tennis, and pickleball. Playing fundamentals, scoring, and rules are stressed. Interclass competition.

Racquetball
Fall and spring. Fee charged.
Two classes a week, Grumman Squash Courts.
Instruction at all levels. Equipment is furnished. Protective eye wear required.

Relaxation and Stress Management
Fall and spring.
Two classes a week, Helen Newman Hall.
Introduction to basic relaxation techniques for the reduction of everyday stress. Techniques will be taught that can be used in normal everyday living situations.

Soccer
Spring.
Two classes a week, Schoellkopf Field.
Introduction to the game. Includes basic individual skills (passing, trapping, shooting) and team play and strategy.

Indoor Soccer
Spring.
Two classes a week for seven weeks, Alberding Fieldhouse.
Basic skills of soccer covered along with tactics specific to indoor soccer.

Squash
Fall and spring. Fee charged.
Two classes a week, Grumman Squash Courts.
Classes for all levels of play. Equipment is furnished. Protective eye wear required.

Triathlon
Fall and spring. Fee charged.
Designed to acquaint students with the components of, and conditioning for, triathlon (running, swimming, and bicycling).

Universal Weight Training
Fall and spring.
Two classes a week, Teagle Hall.
Classes include instruction in correct lifting techniques involving all muscle groups. Recreational classes are established for experienced lifters; structured classes are for novices. Universal weights are used.

Wellness and Fitness
Fall and spring.
Two classes a week, Helen Newman Hall Wellness Lab.
"Here's to a Healthier You" - A wellness experience for the busy student. This course will assess the student's physical fitness status, blood cholesterol levels, and overall lifestyle health habits. Each student will receive an individual exercise prescription and have access to the Wellness Program fitness room in Helen Newman Hall. Lectures on nutrition and stress management are also presented. This course has been made possible through the generosity of the Bateman family in memory of Ms. Dorothy Bateman, Cornell's first director of women's sports and physical education (1920 to 1962).

Aquatic Courses

Beginning Swimming
Fall, spring, and summer.
Two classes a week, Helen Newman Hall and Teagle Hall.
Instruction and practice in basic skills leading to passing the basic swimming proficiency test.

Advanced Beginning Swimming
Fall and spring.
Two classes a week, Helen Newman Hall and Teagle Hall.
This course is ideal for all who have taken one term of Beginning Swimming, regardless of whether the swimming test was successfully completed. Areas of special emphasis are the crawl stroke and rotary breathing, back crawl, elementary backstroke, sidestroke, breaststroke, diving, treading water, and underwater swimming. The primary objective of the advanced beginning swim course is to strengthen the student's confidence and competence.

Intermediate Swimming
Fall and spring.
Two classes a week, Helen Newman Hall and Teagle Hall.
Practice and perfection of basic skills and five basic strokes.

Advanced Swimming
Fall and spring.
Two classes a week, Helen Newman Hall and Teagle Hall.
Practice and perfection of the eleven basic strokes.

Lifeguard Training
Fall and spring. Prerequisite: current Red Cross adult CPR and standard first-aid certification.
One class a week, Teagle Hall.
An American Red Cross certification course. Practice and execution of survival and lifesaving skills. Certification is awarded on satisfactory completion of the course.

American Red Cross Water Safety Instructor Certification
Fall and spring. Prerequisite: American Red Cross Emergency Water Safety course.
Three or five classes a week, Helen Newman Hall and Teagle Hall. Students must not miss first class.
American Red Cross water safety instructor certification is awarded on satisfactory completion of the course.

Diving (Springboard)
Fall and spring.
Two classes a week, Teagle Hall.
Instruction in the basic dives, including front (pike and layout), back, and twisting dives.

Water Safety Instructor Refresher Course
Spring.
Five classes a week, Teagle Hall.
Selected sessions of the water safety instructor certification course.

Introduction to Water Aerobics
Fall and spring.
Two classes a week, Teagle Hall and Helen Newman Hall.
Offers the participant all the components of a standard aerobics class with music, rhythmical routines, resistance activities, cardiovascular conditioning, stretching, and flexibility but in an aquatic environment.

Open Water Scuba Diving
Fall, spring, and summer. Fee charged.
Teagle Hall.
Program includes skill training in a pool and open-water training in Cayuga Lake.
P. A. D. I. open water certification awarded upon successful completion.

Advanced Open-Water Scuba Diving
Fall and spring. Fee charged.
Advanced-level open-water training in Cayuga Lake. For those who have completed the open water course.

Rescue Diver
Fall and spring. Fee charged.
Advanced course for scuba divers. For those who have completed Advanced Open-Water Scuba Diving.

Dive Master
Fall and spring. Fee charged.
Hours to be arranged. Teagle Hall.
Advanced-level scuba course open only to those who have completed the Rescue Diver course.

Bahamas Scuba Diving
Fall and spring. Fee charged.
This course is offered during intersession periods. One week of sailing and diving in the Bahamas. See the information sheet at the registration table.

Specialty Scuba Diving
Fall and spring. Fee charged.
Courses offered in the following specialty areas: navigation, search and recovery, night diving, deep diving, and underwater photography.

Beginning Synchronized Swimming
Fall.
Two classes a week, Helen Newman Hall.
Sculling stunts, including the tub, marlin, log roll, front and back tuck somersaults, and front and back pikes.

Advanced Synchronized Swimming
Spring.
Two classes a week, Helen Newman Hall.
Preparing, practicing for, and presenting an aquatic show.

Swim Conditioning
Fall and spring. Prerequisite: good swimming ability.
Two classes a week, Teagle Hall and Helen Newman Hall.
Introduction to, and practice of, different training methods. Final objective: to swim 2,500 yards during class period.

Advanced Competitive Swim Conditioning
Fall. Prerequisites: a previous competitive swim experience and a previous aquatic conditioning class.
Two classes a week. Teagle Hall practice pool.
This course is offered to those who have highly advanced swimming skills and are interested in competitive swim training.

Board Sailing (Wind Surfing)
Fall, spring, and summer. Fee charged.
Ten instructional lessons plus free practice times. The equipment is furnished.
A Mistral Board Sailing Academy certificate is awarded on successful completion of the course.

Water Aerobics
Fall and spring.
Teagle Hall practice pool and Helen Newman Hall.
Water aerobics is a revitalizing way to get in shape and stay in shape. It offers the participant all of the components of a standard aerobics class in a refreshing aquatic environment: music, rhythmical routines, resistance activities, cardiovascular conditioning, stretching and flexibility. Water exercises have proven, over a extended period of time, to be as effective as the more traditional aerobics' programs but do not produce the injuries. It is the perfect way to exercise for old and young, fit and unfit, prenatal and new mothers, swimmers and non-swimmers.

Water Skiing
Fall and summer. Fee charged.
Three classes a week.
Introductory course for beginning water skiers. Conducted on the east shore of Cayuga Lake. Students must provide their own transportation to and from the lake.

Dance

Aerobic Dance
Fall and spring. Fee charged.
Two classes a week.
A simple dance program designed to keep the cardiovascular system in top shape by making the body demand increased amounts of oxygen.

Ballroom Dancing
Fall and spring. Fee charged. Students and their partners must sign up at course registration.
Includes instruction in the waltz, Charleston, rumba, and tango.

Dance
Fall and spring.
Two or three classes a week, Helen Newman Hall/Center for Performing Arts.
Develop flexibility, coordination, and the ability to perceive and reproduce phrases of dance movement with rhythmic accuracy, clarity of body design, and fullness of feeling. Auditions are required for admission to some advanced courses, since they require the mental and physical ability to perform more-complex phrases in various styles.

African Dance
Asian Dance
Ballet I, II, III
Exploration in Movement (A & B)
Jazz Dance I, II
Modern Dance I, II, III, IV

Fencing

Fencing I
Fall and spring. Fee charged.
Two classes a week, Helen Newman Hall.
Includes warm-up exercises and all basic offensive and defensive moves. Equipment is furnished.

Fencing II
Fall and spring. Fee charged. Prerequisite: Fencing I or the equivalent.
Two classes a week, Helen Newman Hall.
Interclass competition is stressed. Equipment is furnished.

First Aid

Standard First Aid
Fall and spring. Textbook fee charged.
Two classes a week, Alberding Fieldhouse.
American Red Cross standard first-aid course. Certification is awarded on satisfactory completion of the course.

Advanced First Aid
Fall and spring. Fee charged.
American Red Cross certification is awarded on satisfactory completion of the course.

Cardiopulmonary Resuscitation (CPR)
Fall and spring. No credit. Fee charged.
One class a week for four weeks, Alberding Fieldhouse.
American Red Cross CPR certification is issued on satisfactory completion of the course.

Golf

Instruction in Golf
Fall and spring. Fee charged.
Two classes a week, Moakley golf course or Alberding Fieldhouse.
A PGA program of instruction is geared to all levels of experience and ability. The objective is to give beginners enough skill to play, and to give more-advanced players direction in their thinking, practice, and play, through a thorough understanding of fundamentals. Equipment is furnished.

Recreational Golf
Fall and spring. Limited to students who are experienced golfers. Fee charged.
Moakley golf course.
Students must provide their own clubs. Twelve rounds of nine holes each must be played to complete the program.

Gymnastics

Beginning Gymnastics
Fall and spring.
Two classes a week, Teagle Hall.
Basic instruction in tumbling, dance for gymnastics, and use of all pieces of apparatus.

Intermediate Gymnastics
Fall and spring.
Two classes a week, Teagle Hall.
Beginning gymnastics or interscholastic or collegiate team experience.

Jogging

Jogging
Fall, spring, and summer.
Two classes a week, Barton Hall and track.
A program to meet the needs of each participant. Increases capacity from jogging a few hundred yards to three miles at the end of twelve weeks.

Jogging Tours
Fall and spring.
Two classes a week, Barton Hall or Helen Newman Hall.
Each class consists of a two-to-three-mile jogging tour of a local area.

Martial Arts

Basic Karate
Fall and spring. Fee charged.
Two evening classes a week, Teagle Hall.
A beginning course taught by professional staff.

Advanced Karate
Fall and spring. Fee charged.
Two evening classes a week, Teagle Hall.
Open to those who have taken Basic Karate or the equivalent.

Kung Fu
Fall and spring.
Two classes a week, Alberding Fieldhouse.
Exploration of conditioning and fitness procedures used in the major martial arts, such as karate or judo. Covers circular movement for generating strong blocks, kicks, and punches.

Pa Tuan Chin
Fall and spring.
Two classes a week, Teagle Hall.
Pa Tuan Chin (Eight Pieces of Brocade) is a type of exercise from China that develops strength and energy in the body. Movements, which are coordinated with special breathing patterns, are slow, smooth, and deliberate. Muscle exertion can vary depending upon the needs and life-style of the practitioner.

Self-Defense for Women
Fall and spring. Fee charged.
Hours to be arranged, Teagle Hall.
Basic methods of physical protection for women.

Tae Kwon Do
Fall and spring. Fee charged.
A Korean martial art distinguished by its emphasis on high and powerful kicks. Basic kicking, punching, and blocking are emphasized.

T'ai Chi Chuan I and II
Fall and spring.
Two classes a week, Teagle Hall.
Introduction to T'ai Chi, a system of graceful, slow-movement exercises that aim at nurturing relaxation, deep breathing, and improved circulation.

Outdoor Education Program

See the brochure for the Cornell University Outdoor Education Program at registration for more information about courses.

Backpacking in the Finger Lakes Region
Fall, spring.
Classes lead to a full weekend on the trail.

Bicycle Day Touring
Fall and spring.
Afternoon or weekend rides. No overnights.

Bicycle Touring and Camping
Fall and spring.
Rides lead to overnight weekend tours.

Mountain Biking
Fall and spring.
One afternoon per week for five weeks.

Canoe Camping
Fall, spring, and summer.
Outings finish with an Adirondacks expedition.

Canoeing, Flat-Water
Fall, spring, and summer.
Afternoon or weekend outings to local lakes and streams. No overnights.

Canoeing, White-Water
Fall and spring.
Includes three days of white-water trips.

Caving
Fall and spring.
Explore caves in Pennsylvania.

Cross-Country Skiing I and II
Spring.
Six 3 1/2-hour classes. Meets once each week immediately following spring registration.
Van transportation provided for groups of twelve students and two instructors. Ski rental optional.

Cross-Country Skiing–Day Touring
Spring.
Four full-day weekend outings.
Emphasis on backwoods touring. Ski rental optional.

Telemark Skiing
Spring.
Four evenings of lift skiing, plus instructional meetings.

Adirondack Ski Expedition
Winter break.
Ten-day winter camping and skiing trip.

Hiking in the Finger Lakes Region
Fall and spring.
Includes four weekend days of hiking.

Technical Ice Climbing
Spring (winter break).
Includes four weekend days of climbing in February or four days during January break.

White-Water Kayaking I & II
Fall and spring.
Includes three days of white-water trips plus pool sessions.

Environmental Awareness
Fall and spring.
A backpacking/hiking course for those interested in the local ecology.

Outdoor Leadership
Fall and spring.
For those interested in becoming Outdoor Education Program instructors.

Basic Rock Climbing
Fall, spring, and summer. No experience required.
Meets one afternoon a week for six weeks.
Uses indoor Lindseth climbing wall for all classes.

Shawangunks Rock-Climbing Expedition
Fall and spring.
Includes a four-day climbing camp.

Basic Mountaineering Skills
Fall, spring, and summer.
Seven afternoons at local parks and wilderness areas, some classes on indoor Lindseth climbing wall.

Wilderness Emergency Care
Fall and spring.
Friday evenings plus weekend.
Training in medical care for the backcountry. Awards Standard First Aid and CPR certification.

Wilderness Skills Expedition
Fall and spring.
Introductory course. Includes a wilderness backpacking expedition during fall break or spring break.

Wyoming Mountaineering Expedition
Summer.
Full-time course for the entire month of June to train outdoor instructors.

Riflery

Riflery
Fall and spring. Fee charged.
Two classes a week, Barton Hall.
Instruction and practice in the techniques of target riflery from various shooting positions.

Trap and Skeet Shooting
Fall and spring. Fee charged.
Two-hour class one afternoon a week, Teagle Hall.
Includes lectures and shooting at the Tompkins County Rod and Gun Club range. Guns and shells are furnished.

Basic Pistol
Fall and spring.
Barton Hall range.
Instruction in the use of the pistol in the three modes of fifty-foot competitive target shooting—slow fire, timed fire, and rapid fire. Emphasis placed on safety and responsibility while firing.

Introduction to Fly Fishing and Basic Flytying Techniques
Fall and spring. Fee charged.
One class a week, Alberding Fieldhouse.
Introduction in fly casting skills and the art of tying artificial flies. Special Conditions: N.Y.S. fishing license required and each student must provide their own wader boots.

Sailing

Principles of Sailing
Fall, spring, and summer. Fee charged.
One class a week, Cayuga Lake.
Instruction in basic sailing skills and safety principles. Students sail small and large boats on Cayuga Lake, weather permitting.

Intermediate Sailing
Fall. Fee charged.
One class a week, Cayuga Lake.
Instruction in more-advanced techniques for those already familiar with the basic principles of sailing.

Skating

Introduction to Skating
Fall and spring. For beginning to intermediate skaters. Fee charged.
Three classes a week for half a term, Lynah Rink.
Students provide their own hockey skates or rent them at Lynah Rink.

Beginning Figure Skating
Fall and spring. Fee charged.
Three classes a week for half a term, Lynah Rink.
Instruction and practice in basic figure skating techniques: forward and backward, crossovers, turns, and spirals. Students provide their own figure skates or rent them at Lynah Rink.

Intermediate Figure Skating
Fall and spring. Limited to experienced skaters. Fee charged.
Three classes a week for half a term, Lynah Rink
Intermediate figure skating techniques. Students provide their own figure skates or rent them at Lynah Rink.

Advanced Figure Skating
Fall and spring. Fee charged.
Three classes a week, Lynah Rink.
Advanced figure skating techniques. Students provide their own figure skates or rent them at Lynah Rink.

Introduction to Ice Hockey
Fall and spring. Fee charged.
Two classes a week, Lynah Rink.
Stick handling, passing, and shooting are stressed. Students provide their own skates and sticks; all other equipment is furnished.

Intermediate Hockey
Fall and spring. Fee charged. Prerequisite: beginning hockey or participation in organized hockey.
Two classes a week, Lynah Rink.
This course is designed for the intermediate hockey player. Advanced techniques taught include positioning, power play, penalty killing, and offensive and defensive attack. Each session emphasizes game situations and scrimmaging. Skates and hockey sticks must be supplied by the participants. All other necessary equipment will be supplied.

Skiing

Downhill Skiing
Spring. Fee charged.
One class a week, Greek Peak or Song Mountain.
Transportation, instruction, ski-lift fees, and skiing time are offered in a package deal. Greek Peak and Song Mountain personnel are present at registration to explain the program and accept fees. Bus transportation to Greek Peak is provided six afternoons a week for six weeks. Bus transportation to Song Mountain (Friday only).

Cross-Country Skiing - See Outdoor Program.

Team Handball

Team Handball
Fall.
Two classes a week, Alberding multipurpose room.
Team handball combines the skills of running, jumping, catching, and throwing into a fast-moving, exciting game. Elements of soccer, basketball, hockey, and water polo all can be seen in team handball. The basic objective is to outmaneuver the opponent by passing the ball quickly and then throw the ball past the defense and goalie to score.

Tennis

Indoor Tennis
Spring. Fee charged.
Two classes a week, Kite Hill tennis bubble.
Classes for all levels of play. Emphasizes strategy for intermediate and advanced groups. Space limitation requires doubles play.

Outdoor Tennis
Fall.
Three classes a week for half a term. Helen Newman courts and Kite Hill courts.
Classes for all levels of play. Emphasizes strategy for intermediate and advanced groups. Space limitation requires doubles play.

Volleyball

Introduction to Volleyball
Fall and spring.
Two classes a week, Alberding Fieldhouse.
Fundamentals of ball handling, serves, defensive blocks, and position play are stressed. Classes will scrimmage.

Intermediate Volleyball
Fall and spring.
Two classes a week, Alberding Fieldhouse.
Passing and blocking strategy; scrimmages in class.

Advanced Volleyball
Fall and spring.
Two classes a week, Alberding Fieldhouse.
Offensive and defensive team strategy is emphasized in class scrimmages.

[Wrestling for Men
Not offered in 1992–93.]

Yoga

Yoga I
Fall, spring, and summer. Fee charged.
Two classes a week, Teagle Hall.
Fundamentals of hatha-yoga. Covers basic postures, breathing techniques, and deep relaxation. Introduces chanting.

Yoga II
Fall and spring. Fee charged. One (1 1/2 hour) class a week, Helen Newman Hall.
Designed for those who have completed Yoga I or its equivalent.

Independent Study

Independent Study
Fall and spring.
Independent study is designed for those who have difficulty fitting any of the regularly scheduled courses into their academic program. Class activities will be based on personal fitness programs. A term paper is required. Special permission to enter this program must be granted by the program director.

SCHOOL OF CONTINUING EDUCATION AND SUMMER SESSIONS

The School of Continuing Education and Summer Sessions provides a wide variety of educational opportunities beyond the degree-granting programs of the university. These programs serve virtually all age groups in a great variety of formats and time frames. For information about the following programs write B12 Ives Hall, Ithaca, New York 14853–3901; fax: 607/255–9697; or call 607/255–4987, unless indicated otherwise below.

ADMINISTRATION

Glenn C. Altschuler, dean

Alicia C. Dowd, media manager

Judith K. Eger, director, program development and marketing

Abby H. Eller, director, Cornell University Summer College

Terry L. Hart, computing director

Ralph Janis, director, Cornell's Adult University

Charles W. Jermy, Jr., associate dean, and director, Cornell University Summer Session

Cathy M. Pace, registrar

Diane E. Sheridan, director, finance and administration

CORNELL UNIVERSITY SUMMER SESSION

The Cornell University Summer Session provides unique and unusually attractive opportunities for study and recreation at a time when the Cornell campus and the Finger Lakes region of central New York are at their loveliest and the Ithaca weather is at its best. Participants may choose from a wide spectrum of courses scheduled during three-, eight-, and six-week sessions. Although admission is open to persons of all ages, the majority of summer session participants are matriculated Cornell students. Classes meet daily and are usually kept small to foster a close association between students and teachers.

SPECIAL PROGRAMS

Special programs are intensive learning experiences presented year round for professionals in many fields and for undergraduate and graduate students. The varying formats include credit-bearing courses of one to six weeks, noncredit weekend and week-long short courses, on-site fieldwork, and overseas study, among others. Programs can also be designed in response to the needs and interests of corporations, professional societies, and other groups. For information call 607/255–7259; fax 607/255–8942.

CORNELL UNIVERSITY SUMMER COLLEGE

High school juniors and seniors attend regular university courses through Cornell University Summer College and may earn college credit. They also explore career options through specially designed workshops. Students live in residence halls, become familiar with campus life, and attend seminars describing the college admissions process. The program is designed to help ease the transition from high school to college. For information call 607/255-6203, or fax 607/255–8942.

CORNELL'S ADULT UNIVERSITY

Cornell's Adult University (CAU) offers week-long noncredit courses on campus for adults and families during the summer. During the fall, winter, and spring, there are weekend seminars, week-long domestic programs, and international study tours. Developed and led by distinguished members of the Cornell faculty, all programs are inspired by the belief that learning never ends and that one of the roles of a great university is to provide a bridge between traditional formal education and informal, noncredit study. For information, write Cornell's Adult University, 626B Thurston Avenue, Ithaca, New York 14850–2490, or call 607/255-6260.

EXTRAMURAL STUDY

The extensive credit-course offerings of the university are available to area residents on a part-time basis through the Extramural Study Office. Those interested may apply for admission to practically any course in the university and will be admitted if they receive the instructor's written approval. A **Visitor's Program** is also offered. It allows persons to attend classes in many divisions of the university on a space-available basis at a reduced charge. Visitors are required to obtain written permission of the instructor. In this program no credit is given and no record is kept of attendance or performance.

WINTER SESSION

Winter Session provides an opportunity to earn three to four credits between the fall and spring semesters. This quiet time on campus allows students to enjoy classes that are generally smaller and to concentrate on intensive study. Students may enroll in scheduled courses or design an independent study with a faculty member.

CONTINUING EDUCATION INFORMATION SERVICE

This service provides free information, counseling, and referral to women and men who have been out of school for several years and want to resume their education.

EXTENDED EDUCATION INFORMATION SERVICE

This service provides information to people inside and outside Cornell about extended education opportunities offered by the university. These include short courses of all types, workshops, professional updates, and executive programs. To tell us about your offerings or to learn whether Cornell offers a course in a certain area, call 607/255–7259, or fax 607/255–8942.

SUMMER COURSE ROSTER

The Cornell University Summer Session offers a wide variety of courses. The list that follows includes those courses that are usually offered every summer. The list is not exhaustive; many new courses or courses offered only occasionally are not listed. For complete information, contact the Summer Session Office. The summer session catalog is published in February. A preliminary course roster is available beginning in late November.

Africana Studies

AS&RC 100 Afro-American Expressive Writing

A program in African languages is also offered. Consult the department for a complete listing.

Agricultural Economics

AG EC 310 Introductory Statistics

AG EC 320 Business Law

Anthropology

ANTHR 101–102 Introduction to Anthropology

Archaeology

ARKEO 100 Introduction to Archaeology

ARKEO 360 Field Archaeology in Greece

ARKEO 361 Summer Program in Etruscan Archaeology at La Piana

Other field study opportunities are usually available through this department.

Architecture

ARCH 125 Introductory Architecture Studio

ARCH 131 Introduction to Architecture

Consult the Department of Architecture office for a complete list of summer design offerings.

Art

ART 121 Introductory Painting

ART 123 Landscape Painting

ART 133 Introductory Lithography

ART 141 Introductory Sculpture

ART 158 Conceptual Drawing

ART 159 Life and Still-Life Drawing

ART 161 Introductory Photography I

ART 168 Black-and-White Photography

ART 169 Color Photography

ART 171 Computer Art

ART 221 Painting II

ART 261 Photography II

ART 263 Color Photography

ART 264 Photo Processes

ART 321 Painting III

ART 361 Photography III

ART 372 Special Topics in Art Studio

ART 379 Independent Studio

Astronomy

ASTRO 105 An Introduction to the Universe

ASTRO 106 Essential Ideas in Relativity and Cosmology

Biological Sciences

BIO S 107–108 General Biology

BIO S 200 Special Studies in Biology

BIO S 205 Ethics and Health Care

BIO S 208 Drawing the Human Figure

BIO S 209 Introduction to Natural-Science Illustration

BIO S 245 Plant Biology

BIO S 281 Genetics

BIO S 290–291 General Microbiology

BIO S 322 Hormones and Behaviors

BIO S 331 Principles of Biochemistry, Lectures

BIO S 364 Field Marine Science

BIO S 407 Advanced Laboratory Techniques

BIO S 601 Evolution, Ecology, and Behavior for Teachers

BIO S 602 Molecular Biology for Teachers

Chemistry

CHEM 103–104 Introduction to Chemistry

CHEM 207–208 General Chemistry

CHEM 251–252 Introduction to Experimental Organic Chemistry

CHEM 253–255 Elementary Organic Chemistry

CHEM 421 Introduction to Inorganic Research

CHEM 433 Introduction to Analytical Research

CHEM 461 Introduction to Organic Research

CHEM 477 Introduction to Research in Physical Chemistry

Classics

Greek

CLASS 104 Intensive Greek

Latin

CLASS 107 Intensive Latin

CLASS 205 Intermediate Latin

CLASS 369 Intensive Medieval Latin Reading

Classical Civilization

CLASS 109 The Art of Argument: An Introduction to Rhetoric

CLASS 113 Word Power: Greek and Latin Elements in the English Language

CLASS 118 Writing and Reasoning about Modern Moral Questions

CLASS 123 Comedy

CLASS 128 God

CLASS 236 Greek Mythology

CLASS 360 Field Archaeology in Greece

CLASS 361 Summer Program in Etruscan Archaeology at La Piana

Communication

COMM 116 Theories of Human Communication

COMM 120 Introduction to Mass Media

COMM 150 Writing for Media

COMM 201 Oral Communication

COMM 203 Argumentation and Debate

COMM 204 Effective Listening

COMM 216 Communicating Interpersonally

COMM 250 Newswriting for Newspapers

COMM 272 Principles of Public Relations and Advertising

COMM 301 Business and Professional Speaking

COMM 342 Electronic Media

COMM 363 Organizational Writing

COMM 365/665 Scientific Writing

COMM 410 Organizational Communication

COMM 460–461 Video Communication

Comparative Literature

COM L 116 Great Short Masterpieces

COM L 155 Great Books in Western Literature

COM L 236 Greek Mythology

Computer Science

COM S 100 Introduction to Computer Programming

COM S 101 The Computer Age

COM S 211 Computers and Programming

COM S 222 Introduction to Scientific Computation

COM S 314 Introduction to Computer Systems and Organization

COM S 410 Data Structures

Economics

ECON 101 Introductory Microeconomics

ECON 102 Introductory Macroeconomics

ECON 105 Principles of Accounting

ECON 205 Managerial Accounting for Planning and Control

ECON 208 An Introduction to Environmental Policy

ECON 313 Intermediate Microeconomic Theory

ECON 314 Intermediate Macroeconomic Theory

ECON 319 Introduction to Statistics and Probability

ECON 321 Applied Econometrics

ECON 331 Money and Credit

ECON 336 Public Finance: Resource Allocation and Fiscal Policy

ECON 361/561 International Trade Theory and Policy

ECON 362/562 International Monetary Theory and Policy

Education

EDUC 311 Educational Psychology

EDUC 420 Field Experience

EDUC 497 Informal Study

EDUC 501 Communication for Educators

EDUC 513 Psychology of Human Interaction

EDUC 590 Special Topics in Education

EDUC 621–622 Internship in Education

EDUC 730 Seminar in Agricultural, Extension, and Adult Education

EDUC 744 Seminar in College Teaching

EDUC 783 Comparative Extension Education Systems

EDUC 800 Master's-Level Thesis Research

EDUC 900 Doctoral-Level Thesis Research

Engineering

ENGR 100 Introduction to Computer Programming

ENGR 101 The Computer Age

ENGR 202 Mechanics of Solids

ENGR 203 Dynamics

ENGR 211 Computers and Programming

ENGR 222 Introduction to Scientific Computation

ENGR 260 Introductory Engineering Probability

ENGR 293–294 Engineering Mathematics with Microcomputers

English

ENGL 109 The Art of Argument: An Introduction to Rhetoric

ENGL 131 Critical Reading and Writing

ENGL 132 The Personal Essay

ENGL 133 Literature and Writing

ENGL 137 Writing Workshop

ENGL 211 Fantasy and Horror

ENGL 227 Shakespeare

ENGL 270 The Reading of Fiction

ENGL 280 Creative Writing

ENGL 288–289 Expository Writing

ENGL 319 Chaucer

ENGL 327 Shakespeare

ENGL 340 The English Romantics

ENGL 470 Studies in the Novel

ENGL 477 Children's Literature

English as a Second Language

ENGLF 101–102 English as a Second Language

ENGLF 211 English as a Second Language

ENGLB 215 English for Later Bilinguals

Center for the Environment

NTRES 201 Environmental Conservation

Floriculture and Ornamental Horticulture

FRDR 210 Architectural Sketching in Watercolor

Geological Sciences

GEOL 101 Introductory Geological Science

GEOL 102 Evolution of the Earth and Life

GEOL 401 Summer Field Geology in Central Colorado

Government

GOVT 100.1 Historical Voices of the United States

GOVT 100.2 Race, Education, and Politics

GOVT 111 The Government of the United States

GOVT 131 Introduction to Comparative Government and Politics

GOVT 161 Introduction to Political Theory

GOVT 181 Introduction to International Relations

GOVT 311 Urban Politics

GOVT 316 The American Presidency

GOVT 328 Constitutional Politics: The United States Supreme Court

GOVT 342 The New Europe

History

HIST 101–102 Introduction to American History

HIST 151–152 Introduction to Western Civilization

HIST 268 A History of Rome from Republic to Holy City

HIST 314 History of American Foreign Policy, 1912 to the Present

HIST 340–341 Recent American History

History of Art

ART H 202 Survey of European Art: Renaissance to Modern

ART H 261 Introduction to Art History: Modern Art

Hotel Administration

H ADM 174 Microcomputing

H ADM 350/651 Principles of Real Estate

H ADM 487 Real Estate Law—A Case Approach

Human Development and Family Studies

HDFS 115 Human Development

HDFS 150 Families and the LIfe Course

HDFS 216 Human Development: Adolescence and Youth

Human Service Studies

HSS 380 Community Mental Health

Industrial and Labor Relations

Collective Bargaining, Labor Law, and Labor History

ILRCB 200/500 Collective Bargaining

ILRCB 201/501 Labor Relations Law and Legislation

ILRCB 484/784 Employment Discrimination and the Law

ILRCB 608 Special Topics

Economic and Social Statistics

ILRST 210–211 Statistical Reasoning

ILRST 510–511 Introductory Statistics for the Social Sciences

Organizational Behavior

ILROB 121/520 Introduction to Microorganizational Behavior and Analysis

ILROB 371 Individual Differences and Organizational Behavior

ILROB 627 Leadership in Organizations

Personnel and Human Resource Studies

ILRPR 266 Personal Computer Basics

ILRPR 362 Career Development: Theory and Practice

Jewish Studies

JWST 103 Elementary Modern Hebrew

JWST 223 Introduction to the Bible

Landscape Architecture

LARCH 400 AutoCAD/LANDCAD

Marine Science

Consult the Shoals Marine Laboratory section for a complete list of summer offerings in marine science.

Mathematics

MATH 101 History of Mathematics

MATH 105 Finite Mathematics

MATH 109 Precalculus Mathematics

MATH 111–112 Calculus

MATH 123 Analytic Geometry and Calculus

MATH 192 Calculus for Engineers

MATH 200 Basic Concepts of Mathematics

MATH 221 Linear Algebra and Calculus

MATH 222 Calculus

MATH 231 Linear Algebra

MATH 293/294 Engineering Mathematics with Microcomputers

MATH 421–422 Applicable Mathematics

MATH 431 Introduction to Algebra

Modern Languages and Linguistics

Chinese

CHIN 160 Introductory Intensive Chinese (Mandarin)

CHIN 201–202 Intermediate Chinese

Dutch

DUTCH 121–122 Dutch Elementary Course

French

FRDML 101 French Basic Course I

FRDML 123 Continuing French

FRDML 203–204 Intermediate Composition and Conversation

German

GERLA 121–122 Elementary German

GERLA 631–632 Elementary Reading Course

Italian

ITALA 101 Italian Basic Course I

Japanese

JAPAN 160 Introductory Intensive Japanese

JAPAN 203–204 Intermediate Japanese

JAPAN 403 Teaching of Japanese as a Foreign Language

Linguistics

LING 101 Theory and Practice of Linguistics

Nepali

NEPAL 160 Intensive Nepali

Russian

RUSSA 121–122 Russian Elementary Course

Sinhala (Sinhalese)

SINHA 160 Intensive Sinhala

Spanish

SPAND 101 Spanish Basic Course I

SPAND 123 Continuing Spanish

SPAND 203 Intermediate Composition and Conversation

Music

MUSIC 101 The Art of Music

MUSIC 105 Introduction to Music Theory

Natural Resources

NTRES 201 Environmental Conservation

NTRES 215 Environmental Disruption and Regulation

NTRES 218 Science and Politics at Toxic-Waste Sites

NTRES 409 Resource Management in the Yellowstone Ecosystem

Near Eastern Studies

NES 103 Elementary Modern Hebrew

NES 119 Elementary Arabic

NES 219 Intermediate Arabic

NES 223 Introduction to the Bible

NES 295 Modern History of the Middle East

Nutritional Sciences

NS 660 Special Topics in Nutrition

Operations Research and Industrial Engineering

OR&IE 260 Introductory Engineering Probability

OR&IE 270 Basic Engineering Probability and Statistics

OR&IE 622 Operations Research I

Philosophy

PHIL 101 Introduction to Philosophy

PHIL 145 Contemporary Moral Issues

PHIL 212 Modern Philosophy

PHIL 231 Introduction to Formal Logic

PHIL 245 Ethics and Health Care

Physical Education

Consult the Physical Education Office for a complete list of summer offerings for credit and recreation.

Physics

PHYS 101–102 General Physics

PHYS 112 Physics I: Mechanics and Heat

PHYS 213 Physics II: Electricity and Magnetism

PHYS 214 Physics III: Optics, Waves, and Particles

PHYS 400 Informal Advanced Laboratory

PHYS 500 Informal Graduate Laboratory

PHYS 510 Advanced Experimental Physics

PHYS 520 Projects in Experimental Physics

Psychology

PSYCH 101 Introduction to Psychology: The Frontiers of Psychological Inquiry

PSYCH 128 Introduction to Psychology: Personality and Social Behavior

PSYCH 199 Sports Psychology

PSYCH 265 Psychology and Law

PSYCH 280 Introduction to Social Psychology

PSYCH 283 Groups and Relationships

PSYCH 322 Hormones and Behavior

PSYCH 325 Introductory Psychopathology

PSYCH 350 Statistics and Research Design

PSYCH 380 Community Mental Health

Religious Studies

RELST 223 Introduction to the Bible

Romance Studies

FRLIT 201 Introduction to French Literature

Rural Sociology

R SOC 101 Introductory Sociology

R SOC 437 Aging: Issues in the 1990s

Sociology

SOC 101 Introduction to Sociology

SOC 103 Introduction to Sociology: Microsociology

SOC 243 Family

SOC 283 Groups and Relationships

Textiles and Apparel

TXA 114 Introduction to Computer-Aided Design

Theatre Arts

THETR 211 Dance Composition Workshop

THETR 252 Technical Production Studio I

THETR 254 Theatrical Makeup Studio

THETR 282 Introduction to Voice and Speech for Performance

THETR 285 Creativity and the Actor

THETR 287 Summer Acting Workshop

THETR 343 Costume History: From Fig Leaf to Vanity

THETR 354 Stagecraft Studio

THETR 356 Costume Construction Studio

THETR 362 Lighting Design Studio I

THETR 475–476 Seminar in the Cinema

Theoretical and Applied Mechanics

T&AM 202 Mechanics of Solids

T&AM 203 Dynamics

T&AM 310 Advanced Engineering Analysis I

Writing

WRIT 137 Writing Workshop

NEW YORK STATE COLLEGE OF VETERINARY MEDICINE

ADMINISTRATION

Robert D. Phemister, dean

Donald F. Smith, associate dean for veterinary education

Douglas D. McGregor, associate dean for research and graduate education

Neil L. Norcross, secretary of the college

John A. Lambert, assistant dean for administration

Eugenia G. Kelman, assistant dean for student services

Gloria R. Crissey, registrar, director of financial aid

DEPARTMENT CHAIRS

Anatomy: C. Farnum

Avian and Aquatic Animal Medicine: B. Calnek

Clinical Sciences: B. Farrow

Diagnostic Laboratory: D. Lein

Microbiology, Immunology, and Parasitology: R. Avery

Pathology: B. Pauli

Pharmacology: G. Sharp

Physiology: D. Robertshaw

THE COLLEGE

The College of Veterinary Medicine offers a professional program that requires four years of full-time academic and clinical study of the normal and abnormal structure and function of the animal body and the diagnosis, treatment, and prevention of animal disease.

Graduates of the college receive the Doctor of Veterinary Medicine (D.V.M.) degree, which is recognized by licensing boards throughout the world. Graduates generally enter private practice or become engaged in one of the increasing number of other biomedical activities.

Admission requires a minimum of three years of college work, including specific prerequisite courses and experience. Applications must be filed approximately one year before the proposed matriculation date. The competition for admission is keen, since there are many more qualified applicants than can be admitted.

Graduate programs in veterinary research and postdoctoral training in clinical specialties are open to Doctors of Veterinary Medicine and some highly qualified holders of baccalaureate degrees and lead to the degree of Master of Science or Doctor of Philosophy.

More detailed information is contained in the Announcement Catalog of the College of Veterinary Medicine, which may be obtained by writing to the college.

Note: 500- and 600-level courses are open only to veterinary students except by written permission from the instructor.

ANATOMY

VETA 500 Gross Anatomy: Small Animal Fall.

VETA 501 Gross Anatomy: Large Animal Spring.

VETA 502 Microscopic Anatomy Fall and spring.

VETA 504 Neuroanatomy and Clinical Neurology Fall and spring.

VETA 505 Applied Anatomy Fall.

VETA 506 Applied Anatomy Spring.

VETA 507 Animal Development Fall.

VETA 508 Anatomy of the Fish and Bird Spring.

VETA 600 Special Projects in Anatomy Fall and spring.

VETA 601 Research Opportunities in Veterinary Medicine Fall, January, spring, and summer.

VETA 602 Advanced Clinical Neurology Fall.

AVIAN AND AQUATIC ANIMAL MEDICINE

[VETAV 255 Poultry Hygiene and Disease Fall.]

VETAV 555 Avian Diseases Fall.

VETAV 614 Research Opportunities in Veterinary Medicine Fall, January, spring, and summer.

[VETAV 630 Diseases of Aquarium Fish Spring.]

VETAV 631 Fish Health Management Spring.

[VETAV 663 Veterinary Medicine in Developing Nations Spring.]

VETAV 672 Aquavet I: Introduction to Aquatic Veterinary Medicine Mid-May to mid-June.

VETAV 673 Aquavet II: Comparative Pathology of Aquatic Animals Mid-May to early June.

VETAV 770 Advanced Work in Avian Diseases Fall and spring.

VETAV 772 Advanced Work in Aquatic Animal Diseases Fall and spring.

VETAV 773 Advanced Work in Avian Immunology Fall and spring.

CLINICAL SCIENCES

VETCS 520 Preventive Medicine in Animal Health Management Spring.

VETCS 545 Clinical Epidemiology Fall.

VETCS 547 Practice Management Fall and spring.

VETCS 548 Anesthesiology Fall.

VETCS 561 Theriogenology I Spring.

VETCS 562 Theriogenology II Fall.

VETCS 563 Large Animal Medicine and Surgery Fall.

VETCS 564 Large Animal Medicine and Surgery Spring.

VETCS 566 Radiographic Techniques Fall.

VETCS 567 Clinical Nutrition Fall.

VETCS 568 Foundations of Clinical Science I Fall.

VETCS 569 Foundations of Clinical Science II Spring.

VETCS 570 Theriogenology Service Spring.

VETCS 572 Senior Seminar Fall and spring.

VETCS 574 Large Animal Surgery Service Fall and spring.

VETCS 575 Ambulatory Service Fall and spring.

VETCS 578 Clinical Anesthesiology Fall and spring.

VETCS 579 General Medicine and Surgery Spring.

VETCS 580 Radiology Service Fall and spring.

VETCS 582 Large Animal Surgical Exercises Spring.

VETCS 583 Small Animal Medicine and Surgery Fall.

VETCS 584 Small Animal Medicine and Surgery Spring.

VETCS 586 Small Animal Surgical Exercises Spring.

VETCS 589 Small Animal Medicine Service Fall and spring.

VETCS 591 Small Animal Surgery Service Fall and spring.

VETCS 593 Ophthalmology Service Fall and spring.

VETCS 594 Large Animal Medicine Service Fall and spring.

VETCS 596 Opportunities in Veterinary Medicine Fall, spring, and summer.

VETCS 598 Dermatology Service Fall and spring.

VETCS 600 Journal Reading I Fall and spring.

VETCS 601 Dentistry Fall and spring.

VETCS 603 Reproductive Examination of the Mare Fall.

VETCS 616 Research Opportunities in Veterinary Medicine Fall, spring, January and summer.

VETCS 664 Introduction to Epidemiology Fall.

VETCS 665 Study Designs Spring.

VETCS 666 Advanced Methods in Epidemiology Fall.

VETCS 675 Special Problems in Large Animal Medicine Fall and spring.

VETCS 676 Special Problems in Large Animal Surgery Fall and spring.

VETCS 677 Special Problems in Theriogenology Fall and spring.

VETCS 678 Fundamental Techniques in Bovine Embryo Transfer Spring.

VETCS 679 Dairy Herd Management and Health Fall.

VETCS 680 Poisonous Plants Fall.

[VETCS 681 Horse Health Management Spring.]

VETCS 683 Elementary Biostatistics Spring.

VETCS 684 Horse Lameness Spring.

VETCS 685 Introduction to Practice Management January.

VETCS 686 Goats: Management and Diseases Spring.

VETCS 688 Special Problems in Small Animal Medicine Fall and spring.

VETCS 689 Special Problems in Small Animal Surgery Fall and spring.
VETCS 690 Veterinary Dermatology Spring.
VETCS 691 Advanced Large Animal Internal Medicine Spring.
[VETCS 694 Diseases of Exotic Pets Spring.]
VETCS 695 Advanced Equine Surgical Techniques Spring.
VETCS 696 Basic and Therapeutic Horseshoeing Spring.
VETCS 697 Advanced Techniques in Food Animal Surgery Spring.
VETCS 698 Senior Seminar Selective Fall and spring.
VETCS 699 Llama Tutorial Fall and spring.
VETCS 700 Pathophysiology of Gastrointestinal Surgery Fall.
VETCS 701 Pathophysiology of Orthopedic Surgery Spring.
[VETCS 702 Pathophysiology of Cardiopulmonary Surgery Fall.]
[VETCS 703 Surgical Principles and Surgery of the Integumentary System Spring.]
[VETCS 704 Pathophysiology of Urogenital Surgery Fall.]
VETCS 705 Animal Pain and Its Control January.
[VETCS 706 Pathophysiology of Neurologic Surgery Spring.]
VETCS 766 Graduate Research Fall, spring, and summer.
VETCS 768 Master's-Level Thesis Research Fall and spring.
VETCS 769 Doctoral-Level Thesis Research Fall and spring.
VETCS 799 Independent Studies in Epidemiology Fall and spring.

DIAGNOSTIC LABORATORY

VETDL 531 Regulatory Medicine Spring.
[VETDL 611 Mastitis January.]
VETDL 700 Special Projects in Diagnostic Endocrinology Fall and spring.
VETDL 701 Special Projects in Infectious Diseases Fall and spring.
VETDL 702 Special Topics in Infectious Diseases Fall and spring.
VETDL 703 Doctoral-Level Thesis Research Fall and spring.
VETDL 704 Master's-Level Thesis Research Fall and spring.

MICROBIOLOGY, IMMUNOLOGY, AND PARASITOLOGY

VETMI 315 Basic Immunology Lectures (also Biological Sciences 305) Fall.
VETMI 316 Basic Immunology Laboratory (also Biological Sciences 307) Fall.
VETMI 317 Pathogenic Virology (also Biological Sciences 308) Spring.
VETMI 318 Pathogenic Bacteriology and Mycology (also Biological Sciences 304) Spring.
[VETMI 331 Medical Parasitology Fall.]
VETMI 510 Veterinary Parasitology Fall.
VETMI 515 Veterinary Immunology Spring.
VETMI 516 Infectious Diseases I: Bacteriology and Mycology Fall.
VETMI 517 Infectious Diseases II: Virology and Viral Diseases Fall.
VETMI 518 Infectious Diseases III: Infectious and Zoonotic Diseases Spring.
VETMI 605 Special Projects in Microbiology Fall and spring.
VETMI 606 Small Animal Infectious Diseases Spring.
VETMI 607 Virus Diseases of Cattle Fall.
VETMI 609 A Health Program for Sheep Spring.
VETMI 615 Research Opportunities in Veterinary Medicine Fall, spring, and summer.
VETMI 651 Clinical Parasitology of Avian Species Spring.
VETMI 700 The Biology of Animal Viruses and Viral Pathogenesis Fall.
VETMI 705 Advanced Immunology Lectures Spring.
VETMI 706 Immunology Seminar Series Fall and spring.
VETMI 707 Advanced Work in Bacteriology, Virology, Immunology Fall and spring.
VETMI 708 Selected Topics in Animal Virology Spring.
VETMI 709 Laboratory Methods of Diagnosis Fall and spring.
VETMI 710 Microbiology Seminars Fall and spring.
VETMI 713 Special Topics in Immunology: Topic to be announced Spring.
VETMI 719 Immunology of Infectious Diseases and Tumors Spring.
VETMI 737 Advanced Work in Parasitology Fall and spring.
VETMI 767 Immunoparasitology Spring.
VETMI 783 Seminars in Parasitology Fall and spring.

PATHOLOGY

VETPA 535 Veterinary Pathology I Fall.
VETPA 536 Veterinary Pathology II Spring.
VETPA 539 Introduction to Laboratory Animal Medicine Spring.
VETPA 540 Pathology Service Fall and spring.
VETPA 549 Laboratory Animal Clinical Rotation Spring.
VETPA 571 Clinical Pathology Spring.
VETPA 636 Wildlife Pathology Fall.
VETPA 637 Postmortem Pathology Fall and spring.
VETPA 638 The Bottom Line Fall and spring.
[VETPA 639 Autotutorial in Laboratory Animal Medicine and Science Fall and spring.]
[VETPA 640 Principles of Toxicological Pathology Fall.]
VETPA 641 Clinical Immunology Fall and spring.
[VETPA 642 Public Policy and Laboratory Animal Science Spring.]
VETPA 643 The Use of Animal Models to Explore Physiologic and Pathologic Mechanisms in Animals and Man Fall.
VETPA 736 Pathology of Nutritional Diseases Spring.
VETPA 750 Cancer Cell Biology Spring.
VETPA 788 Seminar in Surgical Pathology Fall and spring.
VETPA 789 Seminar in Necropsy Pathology Fall and spring.
VETPA 793 Lectures in General Pathology Fall.
VETPA 794 Lectures in Special Pathology Spring.
[VETPA 796 Medical Primatology Fall.]

PHARMACOLOGY

VETPR 528 Pharmacology I (also Toxicology 528) Fall.
VETPR 529 Pharmacology II Spring.
VETPR 607 Introduction to Pharmacology Fall.
VETPR 608 Basic Pharmocology Fall.
VETPR 610 Introduction to Chemical and Environmental Toxicology (also Toxicology 610) (also Food Science 610) Fall.
VETPR 619 Clinical Pharmacology Fall.
VETPR 620 Advanced Clinical Pharmacology Spring.
VETPR 621 Toxicology (also Toxicology 621) Spring.
VETPR 622 Special Projects in Pharmacology Fall, spring, and summer.
VETPR 629 Research Opportunities in Veterinary Medicine Fall, January, spring, and summer.
VETPR 660 Safety Evaluations in Public Health (also Toxicology 660) Spring.
VETPR 700 Calcium as a Second Messenger in Cell Activation Spring.
[VETPR 703 Receptor Binding: Theory and Techniques (also Biological Sciences 790, Sec. 02) Spring.]
[VETPR 704 CNS Neuropharmacology: Mechanisms of Synaptic Transmission Fall.]
[VETPR 705 Molecular Mechanisms of Receptor-G Protein Coupled Signaling Spring.]

Special Projects and Research in Pharmacology

VETPR 711 The Role of Calcium in Stimulus-Secretion Coupling Fall, spring, and summer.
VETPR 712 Eosinophil Stimulus-Secretion Coupling Fall, spring, and summer.
VETPR 713 Mechanisms of Growth-Factor Action Fall, spring, and summer.
[VETPR 714 Central Nervous System Neurotransmitters Fall, spring, and summer.]
VETPR 716 Neurobiology of Seizure Disorders Fall, spring, and summer.
VETPR 717 Single-Channel Recording Fall, spring, and summer.
VETPR 718 Structure-Function of the Nicotinic Acetylcholine Receptor Fall, spring, and summer.
VETPR 720 Modulation of Nicotinic Acetylcholine Receptor Function Fall, spring, and summer.
VETPR 721 Molecular Mechanisms of Pharmacological Blockade of Voltage-Dependent Calcium Channels Fall, spring, and summer.
VETPR 723 The Role of Calcium in the Control of Electrolyte Transport Fall, spring, and summer.
VETPR 724 The Control of Hormone Secretion Fall, spring, and summer.
VETPR 730 Graduate Research in Pharmacology Fall, spring, and summer.

Special Topics in Pharmacology

VETPR 741 Neuromodulation Fall, spring, and summer.
VETPR 742 Receptor Mechanisms Fall, spring, and summer.
VETPR 745 Biochemical Neuropharmacology Fall, spring, and summer
VETPR 747 Amino Acid Neurotransmitters Fall, spring, and summer.
VETPR 748 Stimulus-Secretion Coupling Fall, spring, and summer.
VETPR 749 Second Messengers in Cell Activation Fall, spring, and summer.

VETPR 750 Cell Calcium Fall, spring, and summer.

VETPR 754 G Proteins in Signal Transduction Fall, spring, and summer.

VETPR 755 Calcium in the Control of Hormone Secretion Fall, spring, and summer.

VETPR 756 Mechanisms of Calcium Handling Fall, spring, and summer.

VETPR 757 Intestinal Electrolyte Transport Fall, spring, and summer.

VETPR 759 Receptor Binding Techniques Fall, spring, and summer.

VETPR 760 Advanced Topics In Pharmacology Fall, spring, and summer.

PHYSIOLOGY

Biological Basis of Sex Differences (Biological Sciences 214) Fall.

Histology: The Biology of the Tissues (Biological Sciences 313) Fall.

Cellular Physiology (Biological Sciences 316) Spring.

VETPH 346 Introductory Animal Physiology, Lectures (also Biological Sciences 311) Fall.

VETPH 348 Animal Physiology Experimentation, Laboratory (also Biological Sciences 319) Fall.

Mammalian Physiology (Biological Sciences 458) Spring.

Undergraduate Research in Biology (Biological Sciences 499) Fall and spring.

VETPH 526 Systems Physiology I Fall.

VETPH 527 Systems Physiology II Spring.

VETPH 528 Veterinary Ethics Fall and spring.

VETPH 612 Research Opportunities in Veterinary Medicine Fall, spring, and summer.

Lipids (Biological Sciences 619 and Nutritional Sciences 602) Fall.

VETPH 625 Problems in Dog and Cat Behavior Spring.

VETPH 626 Problems in Equine Behavior Spring.

VETPH 627 Acid-Base Relations (also Biological Sciences 715) Fall, spring, and summer.

VETPH 628 Graduate Research in Animal Physiology (also Biological Sciences 719) Fall and spring.

[Plasma Lipoproteins (Biological Sciences 712) Spring.]

Stress Physiology (Biological Sciences 711) Fall.

Cardiac Electrophysiology (Biological Sciences 713) Fall.

Physiology of Pregnancy (Biological Sciences 714) Spring.

Regulation of Mitosis and the Cell Cycle (Biological Sciences 716) Spring.

Structure and Function of Joints with Emphasis on Arthritis (Biological Sciences 717) Fall.

[Evolution of Color (Biological Sciences 718) Spring.]

VETPH 720 Special Problems in Physiology Fall and spring.

VETPH 726 Systems Physiology I Fall.

VETPH 727 Systems Physiology II Spring.

[VETPH 752 Biological Membranes and Nutrient Transfer (also Biological Sciences 618) Spring.]

[VETPH 758 Molecular Mechanisms of Hormone Action (also Biological Sciences 658) Spring.]

[VETPH 759 Nutrition and Physiology of Mineral Elements (also Biological Sciences 615 and 659) Spring.]

Fundamentals of Endocrinology, Lecture (Animal Science 427) Fall.

Fundamentals of Endocrinology, Laboratory (Animal Science 428) Fall.

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